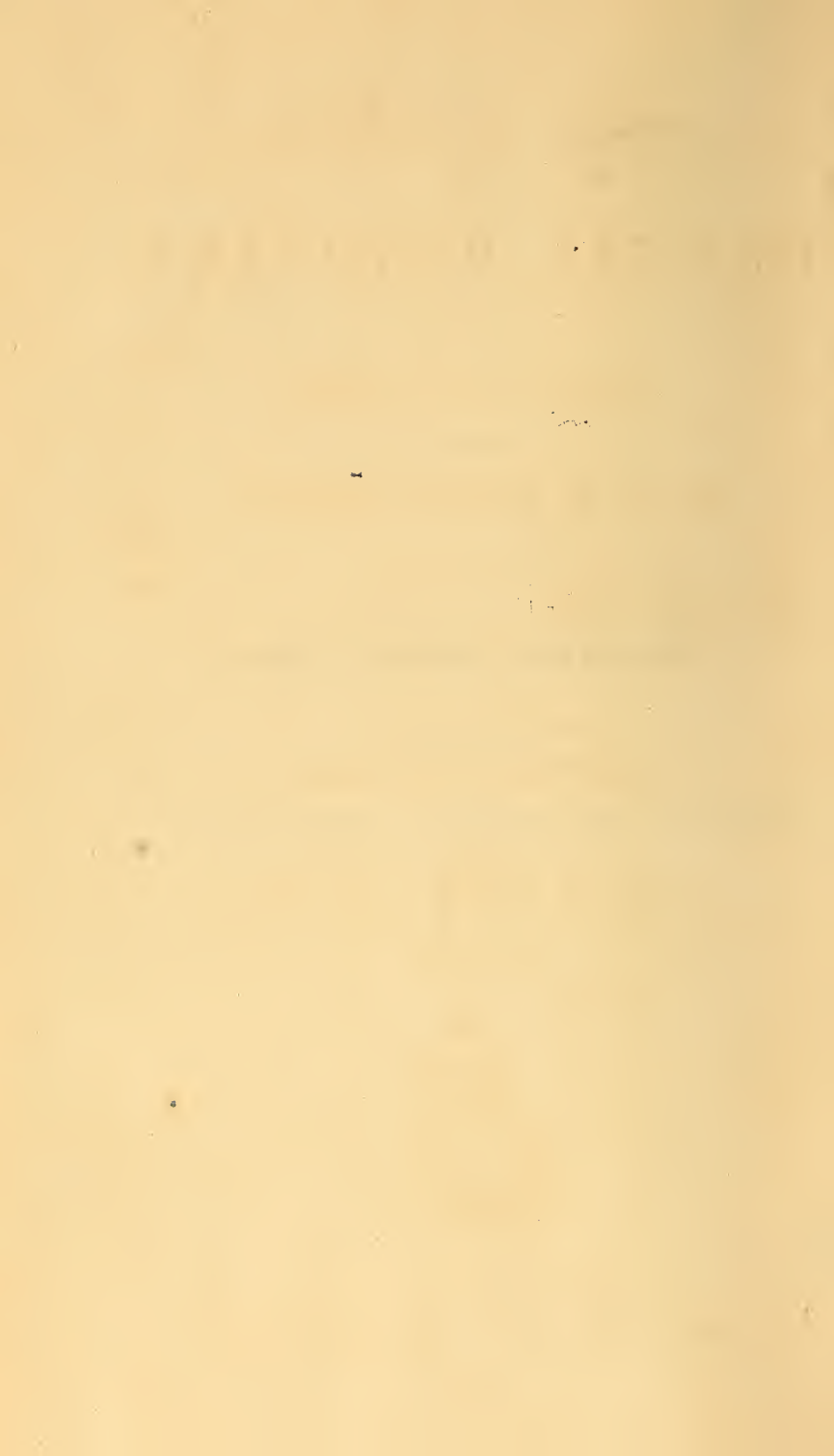




DENTAL MEDICINE,

AS CONNECTED WITH THE

STUDY OF DENTAL SURGERY.



A
PRACTICAL TREATISE
ON
DENTAL MEDICINE,
BEING A
COMPENDIUM OF MEDICAL SCIENCE,
AS CONNECTED WITH THE
STUDY OF DENTAL SURGERY:
TO WHICH IS APPENDED
AN INQUIRY INTO THE USE OF CHLOROFORM,
AND OTHER ANÆSTHETIC AGENTS.

SECOND EDITION,
Revised, Corrected, and Enlarged.

BY
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DENTAL SURGERY.



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TO

My Father,

THIS WORK IS RESPECTFULLY DEDICATED,

BY HIS SON.

P R E F A C E

TO THE SECOND EDITION.

THE author of the present treatise gave it to the public with little expectation that it would meet a favourable reception. Indeed, but for the urgency of a friend, in whose judgment he had reason to confide more securely than in his own, he never could have overcome his reluctance to risk the experiment of the publication.

In the result, however, he has been agreeably disappointed. The unpretending volume was very generally noticed by medical reviewers, in every instance, so far as he is informed, with decided commendation, and a practical evidence of its acceptability was given in the ready sale of the edition.

The author is well aware that he is very much indebted to the personal regard of professional friends for some of the favourable notices of his book, and that, in other instances, he has shared the common urbanity and indulgent consideration with which the conductors of our best Medical Journals are accustomed to encourage all respectable efforts to contribute to the literature of the profession. Nevertheless, he thinks himself authorized to believe, that, after all proper allowance is made for the expression of personal kindness and professional amity, he may, without vanity, ascribe some portion of

the commendation lavished upon the work, to its adaptedness to supply what is felt to be a want; and he, therefore, has determined to offer to the public a second edition.

In preparing this for the press, it was not thought advisable to enlarge the book to an extent that would require a considerable increase in the price; nevertheless, some important matter has been added where the treatise seemed most imperfect.

A chapter upon Anæsthetics has been appended to the work as originally published. The great importance of the subject, and the interest felt in it, required that it should be discussed in a treatise designed for the purposes for which this was written.

The arrangement has been altered where perspicuity and connexion required it. A great number of verbal errors have been corrected; and the typographical execution very much improved. A copious index has also been added.

The author sincerely hopes that the book may prove useful to all who may do him the honour to read it.

BALTIMORE, September 13th, 1852.

PREFACE

TO THE FIRST EDITION.

THE Baltimore College of Dental Surgery was organized with the design of teaching Dentistry as a regular branch of Medicine, in which relation, only, it can be regarded as a scientific pursuit, and the practice of it esteemed as a profession.

With this view it was arranged that the Faculty should consist equally of Dentists and practising Physicians, and to the author of this treatise was intrusted the chair of Special Pathology and Therapeutics. Commencing the performance of his duties with no larger amount of knowledge of the subject than is commonly possessed by medical men, he has been led to discover much more importance in it than at first he could have supposed to exist. Endeavouring to avoid the very natural error of exaggerating the value of isolated facts or doubtful statements, upon matters at once novel and from the circumstances peculiarly interesting, he has found that many things which at first he was disposed to regard as unlikely, are, nevertheless, well-attested and established facts; and, after mature investigation, he has become fully convinced that the relations of the teeth and their appendages with other and even with vital parts, are sufficiently important to be carefully studied both by the Dentist and Physician.

After ten years' experience as a teacher of these subjects, he has found it absolutely necessary that a compendium of medicine should be furnished, in which might be brought together, in a small compass, such selected information as the wants of the Dental Surgeon demand;—and as none has been prepared by another, he has reluctantly undertaken the task.

The difficulty of performing it will readily be conceived, when it is observed how much was proper and how much irrelevant; how cautious it was necessary to be, that no needless matter should be introduced, and how careful that nothing pertinent should be omitted.

Without the pretension of having done it well, the author is yet gratified that it has been done at all.

Though particularly intended for the Dentist, the author flatters himself that he has presented the subject in such a form as will render it deserving the attention of the general practitioner.

It is not the custom of our profession to consider anything unworthy of attention that has a bearing, however remote, upon the benevolent pursuit to which we have devoted our lives, but to the most fastidious it may be said, that subjects which have been thought worthy the attention of Hunter and Rush, may be investigated by any without fear of degradation.

THE AUTHOR.

BALTIMORE, Dec. 31, 1850.

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INTRODUCTION.

THE body of every animal is wisely contrived and perfectly fitted for the purposes it is intended to subserve. Every part, however minute, is necessary to the complete performance of the work of the whole ; and a beautiful unity of purpose, and a necessary dependence of parts, are observable throughout the organization.

So remarkable is this unity, and so certain this dependence, that a naturalist, by examining a fragment of any one of the bones of an animal, may determine the character of the individual it represents. Having ascertained the size, figure, &c., of any bone, he may infer, with infallible certainty, that every other part of the body to which it belonged was formed in perfect proportion to this part, and with strict reference to the purposes for which this particular portion was designed. Should a naturalist ascertain that a single bone presented to him was constructed for purposes of prey, he would immediately infer that a beast so provided must have had strong muscles and bones of the neck and jaws, to enable it to hold and tear the animals upon which it was intended to subsist ; hind legs of such a formation as to enable it to spring upon its prey ; claws to seize and hold it, and a digestive apparatus suited to the reception and assimilation of the food thus procured.

Those who are familiar with the writings of Cuvier, will not need to be reminded of his beautiful reasoning upon this subject.

The body of man must then be regarded as a unit, and though, for the convenience of description, we speak of its mul-

titude of parts, it is a single organization, fed by one aliment, nourished by one blood, vitalized through one nervous system, directed to a common purpose, subject to one sovereign will, and pervaded by a general law of continuance, decay, and dissolution.

As one part of the body is identified with all the others, it is necessary that a certain organic consent shall subsist between the several parts, in order that they may act in concert in carrying on the business of life. For instance, the eyes must act together: the muscles of the trunk must aid the muscles of the limbs, and many more agreements of motion, infinitely complicated and astonishingly rapid, must subsist between different members of the body.

The body has more to do than to perform certain acts by which it may be continued in being. It is, from its nature liable, and from its condition exposed to injuries. It is continually assailed by enemies from without and within. It has, therefore, certain signals of suffering, and is endowed with certain aptitudes, through which any part more particularly attacked may receive succour from the rest. Moreover, the parts being connected together by extension of common tissues, by blood-vessels and by nerves, the morbid conditions of one may readily be propagated to another. All this concert of parts, whether healthy or morbid, is called sympathy;* though, in the case of healthy action, improperly so—and constitutes one of the most interesting and beautiful peculiarities of organized structures.

In many instances the dependence of one part upon another is so direct, and the mode of communication so obvious, that there is no difficulty in detecting the process of sympathetic action or suffering that may be observed between them. In other cases, this concert of action depends upon undiscovered links of union, and is known to exist only upon the evidence of common observation. Besides this sympathy of parts, there is a general interest of the whole organism in the welfare of all its parts; and severe or long-continued suffering in any one,

* Συρ, with, παθος, suffering—fellow-suffering.

however comparatively unimportant, will commonly induce a general derangement of health, and may involve the whole body in serious and even fatal disorder.

Although in many cases no change in the structure of morbidly sympathizing parts might be discovered upon autopsic* observation, yet there is good reason to believe that sympathy is in fact a transfer or propagation of actual molecular change; and every physician knows that a disorder, primarily of little importance, may prove fatal by involving vital organs in a sympathy of disease.

It cannot therefore be predicated of any organ, that its suffering is necessarily unimportant to the health of the whole system, since experience shows that the danger of almost all disorders depends very much upon the sympathies likely to be established in the course of their progress, and that the importance of these sympathies is not always determined by that of the organ originally involved.

The facts above stated are universally admitted by the medical profession, and for the most part are recognised as important practical truths; so much so, that the study of particular parts as isolated from the rest, with a view to treat certain local affections as independent phenomena, has long since fallen into disuse, and every physician and surgeon is expected to become conversant with all of medicine, as necessary to the proper care of any one of the organs of the body. An oculist, unless a thorough physician, would be utterly unqualified to treat diseases of the eye: the obstetrician must extend his knowledge far beyond the uterus, if he would claim any participation in the fellowship of science.

Until very recently, however, the treatment of diseases of the Teeth seems to have been considered less a proper specialty of medicine, than a mere mechanical craft, requiring in the operator little more than manual dexterity and physical force. Surgeons and physicians were generally profoundly ignorant of the importance of these organs to general health, and were con-

* *Autops*—*αὐψ*, one's own eye—actual sight of the parts of a dissected body.

tented to leave them to the care of any who were willing to take charge of them. Even now diseases of the teeth are rarely mentioned in the medical schools, and an eminent professor of surgery has publicly confessed himself incompetent to teach students how to extract them.

In the course of time, however, men of inquiring minds and studious habits, finding themselves in the practice of a rude and imperfect art, the deficiencies of which were continually forced upon their observation, have been constrained to investigate the relations of the teeth to surrounding and distant parts. Well-read medical men, waiving the general practice of the profession, have turned their attention to dentistry, and of necessity have applied their previous information to the augmentation of dental pathology and therapeutics; and, finally, the management of the teeth has come to be an acknowledged specialty of medical science, and is rapidly advancing in public and professional consideration.

It is thus that other departments of the healing art have gradually won their way to their present position and importance. Within a period comparatively recent, surgery in all its branches was regarded by physicians with sovereign contempt. Barbers were the operators, and mountebanks and old women dressed the sores. Midwifery was, if possible, held to be yet more despicable, and even within a few years, an eminent body of scientific physicians have declared obstetrics to be unworthy the attention of a polite gentleman.

It is unnecessary to say that surgery and obstetrics are now the leading branches of the profession, and are zealously practised by men of the first talents, and greatest scientific and literary acquirements.

To our country belongs a large share of the honour of placing these two departments of medicine upon their proper level with other professional pursuits.

The depressed condition of surgery and midwifery was the consequence of the vulgarity and ignorance of those who practised in these departments of medicine, and the bad reputation thus acquired was a formidable obstacle in the way of those

who attempted to elevate them to the dignity of scientific pursuits; but patient continuance in laborious and honourable effort has eventually succeeded in accomplishing the desired result.

The practice of Dental Surgery was long degraded, from causes precisely similar to those evil influences which so long depressed kindred branches of the art. Disregarded by educated men, it necessarily fell into the hands of the ignorant and rude, and precisely as surgery and midwifery have gradually emerged from their barbarous state and attendant disrepute, dentistry is now winning its way against all opposition, to its proper consideration. It is a matter of honest pride, that our country is again foremost in this laudable work.

The purpose of the present work is to treat of Dental Surgery as a distinct and proper specialty of medicine, and to present to the reader a digest of information, prepared with particular reference to the morbid connexions certainly existing between the teeth and the rest of the body.

These connexions are far more important than is generally supposed by physicians or dentists. The reader of the following pages will probably be surprised to find so large a variety of disorders treated of as directly or indirectly concerned in the production of pathological conditions observed in the mouth; and his surprise will perhaps be greater to find so many and so serious diseases of other organs traced to their primary seat in morbid conditions of the teeth. Yet the object of the author has been to condense this treatise as much as consistency would permit, and to admit nothing foreign to the subject properly under consideration.

TREATISE ON DENTAL MEDICINE.

CHAPTER I.

PRELIMINARY CONSIDERATIONS.

THE human body is liable to changes which more or less disturb the regular and healthful performance of the many functions* necessary to the completeness of its life, or in other words, to *disease*. These changes are commonly attended with alterations of the phenomena which experience authorizes us to regard as natural or normal, or in other words, by *symptoms*,† which indicate the character and seat of the change which produces them.

When parts thus diseased are inspected, we generally perceive alterations in their usual appearance and structure. Not unfrequently, however, the changes are too obscure to be detected by our present means of investigation.

Many attempts have been made to define the essential nature of disease, but all have necessarily failed. It is impossible to frame with philosophical accuracy a definition of disturbed or altered conditions, since we do not perfectly understand the nature of the organs, and the mode of their acts. We cannot understand the ultimate cause of morbid phenomena, while

* By *function* is meant the particular part which each organ performs in the mechanism of life. The liver is an *organ*, its *function* is to secrete bile.

† *Symptoms* are those observable differences from the healthy performance of *function* which lead us to suspect and often to detect disease.

ignorant of the essential nature of life itself, as manifested in the healthy performance of function.

It is important to the student to know that medical language does not pretend to the precision of abstract philosophical science. Medical definitions are not to be regarded as accurately stating the nature of things, but simply as descriptions which may serve for practical purposes. This fact has been forgotten by many eminent medical writers, and their efforts to be absolutely accurate have often led to serious mistakes, and always to confusion of ideas and contradiction of facts. The study of essences belongs to metaphysics, not to practical science, and having failed to reach any important truth by analyzing mind, it will hardly prove successful in its attempts upon the body.

We wish it then to be clearly understood, that medical terms are to be received in a conventional sense, and that, while they serve sufficiently well to convey what knowledge we have of curative science, they will not bear the test of strict philosophical examination. For example, the word *life*, as used by medical writers, does not mean the essential vital principle, but the aggregate of the functions of the body: not the ultimate cause which sets the machinery in motion, but its effect in the production of organic acts. *Disease* means all the morbid phenomena observed in a case, together with the structural changes upon which these phenomena depend, and any other more remote injury which may be concerned in their production. Thus a patient may complain of nausea; this sickness may be consequent upon defective digestion; the defective digestion upon interruption of the function of the liver; the interruption of the hepatic* function upon change of structure in that organ; and that change of structure upon more minute pathological† conditions. Strictly speaking, we might regard all this train of evils as symptoms merely of some obscure and inappreciable change which constitutes the disease, but in

* *Hepar*—the liver.

† Pathological—παθος, suffering, λόγος, discourse; that which relates to diseased conditions.

that case the word would be of no practical use. These instances may suffice to illustrate our meaning, and the student may be saved from much embarrassment by keeping the fact thus presented always in his mind. Many false theories and much bad practice have resulted from attempts to philosophize in medicine. It is an experimental science, embodying the results of long experience and protracted investigation. As such it is true, and worthy of all confidence. It is impossible to tell why any medicine produces its effect—we do not understand the *philosophy* of it; but we know what effect it does produce, and that knowledge is sufficient, and very much more important.

I will not trouble my readers with a recapitulation of the many definitions of disease proposed by eminent writers; let it suffice to say, that all of them are improper, and many of them strangely absurd. We can *describe* disease readily enough, but we cannot detect and exhibit its primary elements. Probably we would not be practically wiser if we could do so.

Life, then, may be considered as the effects produced by organization. *Health*, the regular and orderly development of these effects. *Disease*, disorder and irregularity in their manifestation, or impediment to the accomplishment of one or more of them.*

Physiology† has to do with the performance of healthy or natural acts, and physiological medicine or hygiene with the preservation of health. *Pathology* is the science of diseased conditions. *Therapeutics*,‡ the art of applying remedies for the cure or relief of disease. *Anatomy*§ is the study of the body as an organized machine. *Surgery*,|| manual or mechanical medicine. *Etiology*,¶ the science of morbid causes.

In the present treatise, it is our purpose to examine the etiology, pathology, and treatment of morbid conditions, with a special reference to practical dentistry.

* Roche and Sanson, Nouveaux Elements. † Φυσις, nature, λόγος, discourse.

‡ Θεραπεία, I cure.

§ Ανατέμνω, I cut up.

|| Χείρ, the hand, εργον, work.

¶ Έτος, cause.

CHAPTER II.

ETIOLOGY.

CAUSES of disease may be *external* or *internal*. By *external* causes we mean all those agents which are independent of our own organization, whether they produce their impression upon the outward or interior parts of the body. Thus, poison, inhaled or swallowed, would be an external cause, though acting upon internal surfaces.

By *internal* causes we mean all such as are produced from our own organization; as by the action of one part of the body upon another; or by the connexion and dependence of parts; or by the influence of the intelligence itself, which often embarrasses and sometimes overwhelms the physical machine.

By *general* causes, we mean such as affect simultaneously a large part of the corporeal system. By *local*, those which are very much circumscribed in their sphere of action. These terms, like most others used in descriptive science, are not philosophically precise, since every cause must be supposed to act upon some structures to the exemption of others; but they are sufficiently accurate to convey the meaning intended. It must not be supposed that *general* causes necessarily produce general diseases, and vice versa. A local cause, acting only upon a very small surface, may produce universal disorder, while a general cause may beget a strictly local disease. A plunge into cold water, drenching the whole surface, may produce nothing more serious than a toothache; while a prick of a finger may cause serious general disorder and even death.

Further subdivisions of causes are based upon the character of the effects which they produce. Some *stimulate* or increase the action of the blood-vessels; others *debilitate* or lessen such

action. Some act mechanically, dividing, tearing, bruising, &c.; others chemically, burning, corroding, or decomposing.

Predisposing causes are those which exert an influence sufficient to make parts more liable to disorder, without actually disordering them. This term, again, is not absolutely accurate, for we cannot conceive of these causes acting in any other way than in the production of disease, which doubtless they do, but in so feeble a degree as to give out no symptom of its existence.

Exciting or *efficient* causes are those which immediately precede disorder, and are reasonably inferred to have induced it. It must not be supposed, however, that these divisions are absolutely descriptive of certain agents which permanently belong to either of them. A cause which predisposes in one instance may excite in another, and vice versa. For example, a man may be exposed to intense cold, and while extremely chilled he may drink a large quantity of ardent spirits, and fever may ensue. In this instance the cold would be regarded as predisposing and the alcohol exciting. On the other hand, a man may become intoxicated, and while thus enfeebled he may be exposed to cold, and fever or inflammation might result. In this case, the alcohol and its effects would be the predisposing, the cold the exciting, cause.

Some causes are utterly unknown, but are inferred to exist as agents differing essentially from known causes, from the peculiarity and uniformity of their effects. These are called *specific*. The causes of scarlet fever and of whooping cough are examples.

Almost everything without and within us may be in some way or other productive of disorder to the human body. The air we breathe may carry into the inmost recesses of our system invisible poisons, to injure the delicate tissues of the lungs or impair the vivifying quality of the blood; it may withdraw our heat too rapidly, or it may fail to relieve us of our excess of caloric; it may itself undergo chemical changes which deteriorate its qualities and render it more or less unfit for respiration. The food we eat may pain or sicken or convulse us. It may suddenly prostrate, or gradually destroy us. Water, even

when pure, may irritate the disordered organs of digestion, and when impure may carry unsuspected drugs into the stomach. Even the light of heaven may harm the delicate eye, and the sun's heat exhaust the strength or inflame the brain; while that all-pervading and powerful agent which we call electricity, entering our bodies at will, and playing upon our nerves at pleasure, may work in us fearful but inscrutable changes.

We are constantly exposed to the rude contact of bodies harder than our own, by which our tissues may be divided, broken, torn, or penetrated: while other substances possess a mysterious power, to combine chemically with the elements which compose our bodies, and form of them new products, thus altering and disorganizing the parts subjected to their action.

Nor are the enemies of health and life within us less active or efficient. The exquisitely organized body is continually undergoing change, and in all its parts is at work an irresistible law which impels the whole to decay and dissolution. Linked together by exquisite sympathies, traversed by numberless nerves and blood-vessels, performing most delicate and important functions, and pervaded by a powerful moral intelligence, whose passions and appetites excite and depress the physical system to its utmost limits of endurance, the parts of the body are continually liable to become diseased, and to radiate disorder throughout the whole.

It will be impossible for me to introduce into the present work a full examination of each of the many causes of disease which might be worthy of particular notice. I will only ask the attention of the reader to the consideration of such as are most important to us, as being concerned in the production of those diseases which the dental surgeon is expected to treat.

THE ATMOSPHERE.*

The air acts upon us in a variety of ways. By its pressure upon us it keeps us in form. Without that pressure the fluids

* The atmosphere is composed of two great elements, called oxygen and nitrogen, with a small portion of carbonic acid.

coursing within us would overcome the resistance offered by the coats of their vessels, and universal turgescence, interruption of function, and death would ensue.

It furnishes us with the oxygen necessary to preserve the vitality of the blood. Were the natural proportion of this element increased or diminished, we must suffer hurt. It is also the vehicle by which watery vapour acts upon our outward and inner surface, and the medium by which caloric or the matter of heat is brought into contact with us. It is therefore the means by which we feel those hygrometrical changes which have so much to do with our health, and the vicissitudes of temperature which, as morbid causes, are hardly less important.

Increase in the density of the air has been known to produce serious epidemic affections. Persons who ascend high mountains generally suffer much from embarrassed respiration; and hemorrhages and pulmonary affections have been traced to changes in the mechanical action of the atmosphere.

Unless the supply of air be unequal to the want, the quantity of oxygen in the atmosphere has never been found deficient; but where persons have resided or been confined in crowded and ill-ventilated rooms, the most serious consequences have often resulted. When the deficiency of air is not so great as to produce rapid and violent results, the health often languishes, the complexion fades, the strength fails, and diseases of various kinds make life wretched, and shorten its duration. In the gorges of mountains are often found decrepid, deformed, and even idiotic people, who bear sad testimony to the evil effects of depraved air, though the precise mode of vitiation is yet undiscovered.

Heat and cold are universally recognised as having much to do with the causation of disease. Caloric or the matter of heat pervades all bodies, and constantly tends to an equilibrium. The animal heat which is elaborated by some obscure process, but little understood, obeys the common law of caloric, and constantly passes off to bodies less warm, or receives increase from those more heated. Our sensations of heat and cold are therefore nothing more than indications of the loss and supply

of caloric to our surface. When it passes off in greater quantity than we can supply it with comfort to ourselves, we complain of cold; when surrounding bodies draw less from us than we are in the habit of supplying, or communicate to us of their own excess beyond our wants, we feel heated. These variations in our state of calorification are not limited in their effect to the production of certain sensations. They are capable of causing great disorder in the performance of function, and creating morbid conditions of the most serious kind. Heat is an exciting, cold must therefore be a depressing agent. Heat induces increased action of the heart and arteries; cold diminishes that action. But in considering the consequences of agents acting upon the human body, we must always remember that it is a *living* machine, and is not merely passive under modelling influences. A thorn penetrating the substance of an inanimate machine, would produce no other consequence than the mere perforation; but should it pierce the human body, it would induce a succession of phenomena, depending upon the vitality of the parts injured. Heat acting upon a bar of iron will expand it; cold will contract it. Acting upon the human body, heat will not only expand its tissues, it will excite the parts to increased action. Cold will not only contract the tissues, but lessen action. Further, heat, if long continued, will exhaust the vigour of the nervous and vascular system, and thus debilitate the whole frame; for it causes the organs to work more rapidly than usual—consequently to consume more of the means of action, while it adds nothing to those means. It does not increase the amount of blood, nor enrich its quality, but it causes it to be more rapidly circulated and consumed; it provides no additional nervous energy, but causes greater expenditure of it. In the course of such unusual consumption and expenditure, the parts appear more than commonly vigorous, but the result must be that the supply of means shall soon fall below the usual consumption, and languor, depression, or exhaustion result. Heat,* in other words is an excitant or stimulant, and all agents

* It will be perceived that we use this word in the popular sense, as conveying the idea of a certain sensation. When we speak of heat as an exter-

of this class will enfeeble as their secondary and ultimate effect.

Cold, being the opposite of heat, is of course depressing, as being the withdrawal of an excitant. But there is in the living body a recuperative power which exerts itself energetically to overcome morbid influences. This power we call reaction, and its chief phenomenon is increase of vascular action, up to and beyond the natural standard. When cold is suddenly applied to the body, the first effect is to lessen vascular action and nervous sensibility; but unless the application be very long continued, the circulation will soon resume its vigour, a glow of warmth will succeed to the chill, and perhaps the heart and arteries may work with a force and frequency incompatible with health.

In order to explain certain pathological conditions, of very common occurrence in every part of the body, it is also important to observe that when parts are suddenly chilled by the rapid abstraction of their natural heat, their nervous excitability, or the power of being impressed by agents, is *increased*.* Every one has remarked the extreme sensibility of the fingers on a cold day, and dentists are well aware that delicate patients cannot endure protracted and painful operations in the winter as patiently as in the summer.

To a man nearly frozen, it would be death to bring him to a blazing fire. Frost-bites are nothing more than burns inflicted at very low temperatures, upon parts unusually susceptible through the abstraction of heat.

If this be true of cold, the converse is true of heat. Protracted heat, as indeed the long action of all stimulants, wears

nal agent, we of course mean the presence of caloric in a quantity so unusual as to create the sensation of heat. Caloric itself is absolutely necessary to life, and does not exhaust vitality when present in its normal or natural quantity.

* This is true in the case of the sudden diminution of any of the essential means of life. If food be withdrawn for a considerable time, the accumulated excitability of the system will make it dangerous to give the starving man an ordinary meal. If blood be abstracted, the whole system becomes more easy to be acted upon by food, medicines, &c.

out the excitability, and renders the body difficult to be impressed. Debility or weakness may be connected with both of the nervous conditions; hence weakness alone is not a characteristic of any disease, it is merely a circumstance of it. A man half-starved would be very weak, and might be too much excited by a single glass of fermented liquor: another, exhausted by long-continued intemperate drinking, might be equally debilitated, but could not be excited by immense quantities of distilled spirit.

These remarks upon the effects of cold and heat will enable us to understand the mode of production of many particular affections, through the agency of atmospheric changes.

Excessive moisture in the air is also a common cause of disease, but only because the watery vapour withdraws our heat much more rapidly than dry air, at the same temperature, would do.

Air is also the vehicle through which aerial poisons of various kinds are brought to act upon us.

We have mentioned *specific* causes, as the unknown agents which produce peculiar and uniform disorders. Some of these causes can only produce their effects through the air when it is highly charged with the poison; others can act at great distances from their source, and apparently when much diluted by atmospheric mixture; and others have never been traced to any local origin, and while apparently poisoning the air over immense spaces, produce no change in it which is appreciable to our nicest tests.

Of the first class are the *contagions*, which may be propagated either by direct contact or by atmospheric infection within short distances; of the second are the causes of *endemic* diseases; and of the third are the inscrutable agents which produce those widespread disorders which we call *epidemics*.*

* Endemic, *ενδημος*; epidemic, *επιδημος*. By endemics we mean diseases largely prevalent in a certain vicinity, and often traceable to a local cause, and always dependent upon such. An epidemic has no connexion with locality, and evidently does not spring from a local cause. The yellow fever is an example of an endemic; cholera of an epidemic.

The scope of our work does not include the causes of contagions and epidemics; but as certain endemic diseases frequently exhibit themselves in the mouth and face, and very much embarrass the dentist who may unfortunately be ignorant of their cause, nature, and treatment, it is necessary for us to notice particularly the atmospheric vitiation, which causes them.

MALARIA.

It has been observed, from time immemorial, that the borders of sluggish streams and stagnant pools, and the vicinity of marshy grounds, are unwholesome, and that persons who dwell in such places, or even remain there during a short time at certain seasons, are subject to peculiar disorders, not observed elsewhere, and evidently not produced from ordinary influences. To the causes of these diseases, which, though unknown in their nature, must be immediately connected with the peculiarities of the locations in which only they are observed, several names have been given, such as marsh miasma, malaria, and marsh poison.

To this agent must be attributed by very far the greatest part of endemic diseases, and those which are most destructive of health and fatal to life. The yellow fever of the West Indies and America, the plague of the Mediterranean coasts, the coast fever of Africa, the jungle fever of India, the remittent or bilious, and the intermittent or ague, of many places, and many other affections which it is unnecessary to mention, are the productions of the poisonous emanations from wet soils.

We have not as yet been able to discover the nature of marsh poison. The most careful analysis of air selected from the most pestiferous fens has not developed any alteration in the proportion of the elements of the atmosphere, nor any foreign matter whatever. Yet we have sufficient evidence to justify us in believing that the poison does act through the atmosphere, and the failure to detect the subtle agent only proves the inadequacy of our means of analysis to separate it from its atmospheric connexion or combinations.

Malaria is evolved during the day by the action of the sun upon wet ground containing dead vegetable matter. This is apparent from long-continued observation of the circumstances attending its development. It is only when decayed vegetable matter is subjected at the same time to heat and moisture that malarious diseases are engendered. Many neighbourhoods in this vicinity are healthy in June, when vegetation is in luxuriant growth, which become pestiferous in the latter part of summer, and the early part of autumn. The reason evidently being that it is dead, not living vegetation, that produces the poison.

Several attempts have been made to establish the independence of malaria upon vegetable material, but no writers have presented satisfactory evidence to sustain the supposition, and the whole tenor of human experience is adverse to it.

That malaria is extricated by the sun, is evident from the well-known fact of its lessened production during cloudy weather. That it ascends rapidly during the day seems to be shown by the circumstance that deadly localities may be visited with impunity when the sun is high, the visiter being obliged to make his retreat before the evening dews begin to be precipitated.

It ascends with the watery vapour which is simultaneously disengaged, and commonly requires to be precipitated and concentrated by the cold of evening before it exerts its malign influence. Hence the popular dogma that summer dews are unwholesome; an opinion based upon the experience of the fact just stated. The danger, however, is not from the dew, but from the concentrated malaria simultaneously present.

There are cogent reasons for supposing that the cause of the endemics in question is not one and the same for all of the distinct disorders belonging to the category of malarious diseases, but that each has its separate and peculiar poison, though all are the product of vegetable decomposition under the combined operation of heat and moisture.

The commonly received opinion is, that the several forms of disease ascribed to malaria, are the consequences of the action

of one poison more or less diluted by atmospheric moisture. Yellow fever, for instance, representing the effect of a highly concentrated malaria; remittent bilious fever, of a more diluted poison, and intermittent fevers and neuralgias being the product of the agent in a yet more free atmospheric commixture.

This theory receives some confirmation from the fact that yellow fevers occur only near the source of malaria, while agues may be induced several miles from it.

But a moment's consideration will convince us that this explanation is opposed by invincible objections. The diseases produced by malaria have little resemblance. The mode of treatment required by them is, in some cases, as widely different as the treatment of any other distinct disorders; and moreover, if bilious remittents, quotidians, tertians, &c., are representatives of a gradually declining intensity of poison, their violence should certainly be, barring the accidents attending individual cases, invariably in the same ratio with the poisonous concentration.

This, however, is not by any means the fact. The congestive bilious fever of our Atlantic coast is in every respect as formidable a disease, in fact more so, than the yellow fever of New Orleans; and a malignant intermittent will destroy its victim in as little time as any other disease engendered by malaria can do.

I fear that what, I venture to think, the common mistake upon this subject, has caused much unfortunate practice. The treatment of remittent and intermittent fevers having been conformed to much too closely on account of the supposed identity of cause suggesting an analogy of nature, which certainly does not exist.

It would be incompatible with the design of the present work to discuss fully this and other interesting questions connected with these wide-spread and destructive emanations. The subject, however, is well worthy of the careful attention of every man, and especially of every student of medical science. Ignorance of facts connected with it, which might be learned in a few

hours, annually causes the death of many, who unnecessarily expose themselves to the assaults of fatal pestilence.

The only known prophylactics* against malaria are the intervention of thick woods between the source of the poison and the house, and the rarification of the evening air of the dwelling by fires.

MECHANICAL AND CHEMICAL CAUSES.

It is not necessary to particularize the mechanical and chemical causes which may injure the human body generally, nor would it be consistent with my purpose to examine in detail the effects of aliments, occupation, &c., in the occasional production of disease. These considerations belong to general hygiene, and if introduced here, would augment this work to an inconvenient size. I will, therefore, only allude to those matters as occasion may require in the progress of our discussions.

In organs endowed with a high degree of vitality, the laws of chemical affinity are inoperative, being subordinate to an inexplicable and all-controlling law of life. This, however, is only true within certain limits, for some chemical agents will always enter into combination with the animal tissues, whether living or dead, when brought into contact with them.

The enamel and even the bony structure of the teeth are acted upon very readily by many acids, both vegetable and mineral, which combine with the earthy base, lime, and form new compounds with it, breaking up, of course, the integrity of the organ. The enamel is a crystalline mineral substance and possesses no vital organization, consequently it is quite as liable to be acted upon by chemical agents while in its normal place, as it would be when separated from the body. It is therefore very easy to perceive, that this external defence of the tooth may be very easily penetrated and the ivory of the organ laid open to the action of alimentary matters and fluids of the mouth.

It is from this cause that what is called caries results. Un-

* Προφύλαξις,—prophylaxis, from προφυλάσσω—I guard against.

fortunately the word is used to express an affection of the bones entirely different from the peculiar disorganization called caries of the teeth. The former is a modified vital process, analogous to ulceration of the soft parts, the latter is a chemical erosion. Dr. Westcott has published* the results of some interesting experiments made by him for the purpose of testing the activity of certain chemical agents upon the teeth. The mode of these experiments was as follows :

A water-bath was prepared, kept constantly at 98° by a spirit lamp, and regulated by a thermometer. In these were placed vials containing the substances to be tested. In each of these was placed a human tooth—care being taken to select those of as similar organization as possible, and whose enamel was perfect.

A hundred articles, such as are most commonly used as food, condiments, or medicine, were thus tested, and uncommon care was taken to watch the progress of the chemical action upon the teeth, subjected to such application.

The results of these experiments are summed up by Dr. Westcott in the following declarations :

1st. Both vegetable and mineral acids act readily upon the bone and enamel of the teeth.

2d. Alkalies do not act upon the enamel of the teeth. The caustic potash will readily destroy the bone by uniting with its animal matter.

3d. Salts, whose acids have a stronger affinity for the lime of the tooth, than for the base with which they are combined, are decomposed, the acids acting upon the teeth.

4th. Vegetable substances have no effect upon the teeth until after fermentation takes place, but all of them capable of acetic fermentation, act readily after this acid is formed.

5th. Animal substances, even while in a state of putrefaction, act very tardily, if at all, upon either bone or enamel. On examining the teeth, subjected to such influence, the twentieth day after the experiment, no visible phenomena were presented

* Vide Amer. Journal of Dental Science, Sept. 1843.

except a slight deposit upon the surface of a greenish slimy matter somewhat resembling the green tartar often found upon teeth in the mouth.

Acetic and citric acid so corroded the enamel in forty-eight hours that much of it was easily removed with the finger nail.

Acetic acid or common vinegar, is not only in common use as a condiment, but is formed in the mouth whenever substances liable to fermentation are suffered to remain about the teeth for any considerable length of time.

Citric acid, or lemon juice, though less frequently brought into contact with the teeth, acts upon them yet more readily.

Malic acid, or the acid of apples, in its concentrated state, also acts promptly upon the teeth.

Muriatic, sulphuric, and nitric acids, though largely diluted, soon decompose the teeth. These are in common use as tonics.*

Sulphuric and nitric ethers have a similarly deleterious effect; these are used frequently as diffusible stimulants. The acids of some of the salts also corrode the teeth. Supertartrate of potash, or cream of tartar, destroys the enamel very readily. This article is frequently used to form an acidulated beverage. (It is also the basis of certain popular dentifrices, which whiten the teeth by corroding their surfaces.) Raisins so corroded the enamel in twenty-four hours that its surface presented the appearance and consistency of chalk.

Sugar had no effect until it had undergone acetous fermentation.

Mechanical causes breaking the enamel, although the fissure through it may be very small, will ultimately cause the destruction of the tooth by permitting access to it by the fluids of the mouth, particles of vegetable food which being detained undergo acetic fermentation, and even the atmospheric air which is very irritating to all parts of the body not intended to be exposed to its action. The habit of cracking nuts, &c., with the teeth, and the very absurd use which females

* Tonics are medicines which invigorate the system, or impart *tone* to the muscular fibres.

make of their front teeth to do the office of scissors upon threads, cause a great destruction of these organs.

The lamentable extent to which the young people of this country are subject to disease and loss of their teeth calls for close observation and anxious inquiry into the cause. Hitherto I confess that I have heard of no satisfactory explanation. The evil is of great magnitude and seems to be extending. A mouth full of artificial teeth is no longer an indication of age; we look for porcelain almost as naturally in the mouth as in the cupboard, and the bills of the dentist are as regular and perhaps as large as the grocer's. Were deformity, vexation, and expense the only evils attendant upon this devastation of the mouth, it might be endured more philosophically, but in truth, *digestion can hardly be said to be perfectly performed after a large part of the teeth are destroyed*. No artificial substitutes are more than appurtenances in usefulness to the natural organs. The fact that the chewing must be done by them, leads to the self-denial of much nutritious food and to the substitution of less suitable aliment, while even that is often sent to the stomach without proper preparation.

CHAPTER III.

SYMPTOMS OF DISEASE.

ALL changes in normal phenomena observed to attend diseases are called symptoms. Sometimes we know nothing more of the disease than that it causes certain appearances, and in fact we are commonly compelled to regard the symptoms as the evils to be combatted, and to rely mainly upon experience for the proper means of relief. The skill of the physician and surgeon is chiefly exercised in interpreting these signs correctly and pursuing their indications to the desirable result.

Sometimes a case will present but a single symptom, as pain in a tooth; at other times, while one particular symptom indicates the seat and nature of the primary malady, a number of secondary and collateral signs will claim attention and clamour for relief, and again all the morbid appearances may be so general and vague as to afford no satisfaction as to the nature and seat of the disease.

Local symptoms are those which present themselves in the very seat of the disease; *sympathetic*, such as are manifested in other organs than that primarily affected, and which are dependent upon the distant disease, being due to their relations with it through the brain, spinal marrow, and sympathetic nerves. General symptoms are such as affect a large part of the body simultaneously.

Generally speaking the local symptoms are the most important, as they indicate the seat of the disease, upon the extent and intensity of which the suffering of the sympathizing organs depends. It is always exceedingly important to detect these local symptoms and deduce from them correct knowledge of the pathological condition they represent. But this is often a

matter of great difficulty, as the greater intensity and obtrusiveness of sympathetic symptoms may deceive us, and we may readily mistake them for local symptoms.

Sympathetic symptoms are worthy of careful attention, for though caused by distant disorders, yet they manifest real disturbance in the organs to which they belong, and it often happens that these sympathizing organs suddenly assume diseased conditions of the most alarming character. The judicious physician will watch them carefully, especially if the brain be the seat of them.

General symptoms are those manifested by the heart and arteries, and the nervous system, which, acting throughout the whole economy, when disordered give out everywhere signs of distress.

PROGRESS OF DISEASE.

A disease is said to be *continuous* when its prominent symptoms are not interrupted by any law of the disorder, from the commencement to the end of it. We have an instance of this in continued fever.

We use the term *intermittent* to distinguish a very important class of disorders, characterized by a regular periodical disappearance and return of symptoms. Such are agues.

Remittents are those diseases which present, as a characteristic symptom, a periodical abatement of intensity, very manifest, though not amounting to intermission. The bilious fever of our country belongs to this class.

Diseases are said to be *acute* when they run their course rapidly: chronic* when they occupy a comparatively long time in their progress.

The student must not suppose that the term *acute*, necessarily implies violence or intensity. It is true that violent disorders are commonly of brief continuance, but it does not follow that all diseases of brief continuance must be severe. Neither is it true that chronic diseases are less serious than

* *Xpovos*—time.

those which are more rapid, for the reverse is very frequently the case. The terms acute and chronic have reference to duration and not to intensity.

As a general rule, all diseases abate their severity early in the morning, and increase it in the evening. This increase is called an exacerbation; if very severe, a paroxysm. This last term has a peculiar meaning when applied to intermittents.

The phenomenon of *intermission* is one of the most curious and inexplicable of all observed by the physician. The diseases characterized by this peculiarity consist of an indefinite number of attacks or paroxysms, each of which, after having exhibited a succession of conditions, disappears, leaving no symptom of disease, except the exhaustion of the patient be considered such. After a certain time of intermission or exemption, another attack is sustained, and so the disease progresses, by alternate paroxysms and departures. Each paroxysm consists of a chill or cold stage, a fever or hot stage, and a sweating stage, in which the fever disappears, and the intermission commences.

If there be a paroxysm in every twenty-four hours, the disease is called a quotidian;* if it occur on alternate days, a tertian,† if there be two days of intermission, a quartan,‡ &c.

Sometimes there will be two paroxysms a day, a double quotidian; sometimes there will be a paroxysm every day, but the time of access corresponding on alternate days; this is called a double tertian. Sometimes there will be a double paroxysm upon alternate days, with a single paroxysm upon the intermediate day; this has been called a triple tertian. Many other modifications of periodicity occur in the disease, but the intermission is distinct in all. The quotidian and tertian are by far the most common forms of ague. Cases have happened in which the paroxysm has returned after an intermission of two weeks, and continued to occur regularly for months together.

It not unfrequently happens that the paroxysms occur regu-

* Quotidian—quotidies, daily.

† Tertian—tertius, third.

‡ Quartan—quartus, fourth.

larly, but do not present the ordinary succession of chill, fever, and sweat, but merely cause excessive pain in some sensitive part, usually occupying but little space. This pain obeys the law of intermission and periodicity as other forms of paroxysms do, and is known as intermittent neuralgia.*

It is very important that the dentist should be well acquainted with this form of disease, as it frequently occurs in the teeth and parts about the jaws, &c., and may be easily confounded with toothache from local causes; a mistake which has caused the infliction of much unnecessary pain, and the loss of valuable teeth.

Remittent diseases are characterized by a remarkable diurnal abatement of their symptoms, not amounting to intermission, but apparently analogous to it. Some of the most fatal diseases which afflict the human family are of that class. For example, yellow and bilious fever.

Certain diseases always present the same symptoms, and in the same order, and perseveringly run through them all unchecked by treatment, or the circumstances of age, sex, constitution, &c., which powerfully control other diseases. The small-pox, measles, hooping-cough, &c., are examples of this class. They arise from specific causes, and are sometimes called specific diseases, though this term includes other disorders of entirely different character.

* Neuralgia, from *νεῦρος*, *neuros*, a nerve, and *αλγος*, *algos*, pain.

CHAPTER IV.

DIAGNOSIS.

DIAGNOSIS* is the art of following symptoms to their proper pathological cause, and ascertaining the character, location, and extent of disease, of which they are the signs. This, of course, involves the discrimination of one kind of disorder from all others, and is often extremely difficult, sometimes impossible. When one or more local symptoms are prominent beyond others, we may sometimes ascertain at once the seat of the disease, but even in such cases we must not decide until we shall have ascertained whether these local symptoms are primary or sympathetic; an inquiry which often requires much general knowledge of disease, and a capacity for close consecutive reasoning.

When our attention is first called to a patient, we often encounter a large number of symptoms of different kinds, proceeding from various organs, and all calling for relief. In the midst of this general outcry of organs, the attentive observer will generally detect one voice of distress more earnest than the rest, and directing his inquiry to the part thus designated, he frequently will come at once upon the cause of the general trouble. The local signs are always the most important, and withal, often the most obscure. The first thing to be done, then, in the conduct of diagnosis, is to ascertain whether there are any local signs; next to discover, whether any or all of them are sympathetic, and if so, of what primary affection; and lastly to consider whether the general and sympathetic symptoms corroborate our suspicions, that is, whether they can all be accounted for upon the supposition that we have found the local

* Δια κινουμένη, I know through, or thoroughly.

cause, and whether any are absent which are uniformly or commonly concurrent with similar conditions to those supposed to exist.

It sometimes happens that diagnosis will detect disease in two or more organs simultaneously, or *complication*.

It would of course be impossible for any man to conduct a diagnosis properly upon a case of disease unless he should be acquainted with diseased conditions generally, and particularly with the relations and sympathies of parts. The dental surgeon is not prepared to investigate symptoms occurring in the mouth until he can detect those which are sympathetic, and trace them to their source. Were he guided only by a prominent local symptom, he might make serious mistakes. For instance, a female may complain of violent pain in a tooth, which may in fact be entirely due to sympathetic connexion with the uterus, and not at all dependent upon any diseased condition of the tooth in which it occurs.

The mode of distinguishing dental diseases and those of the parts adjacent to the teeth and mouth is fully set forth in works of dental surgery. I will, therefore, omit any particular directions upon this subject; but I would earnestly urge upon every dentist to extend his knowledge until it shall embrace the entire subject of diseases and their cure.

Independently of the necessity of diagnosing the local affections, it is always important to ascertain those conditions which are immediately represented by general symptoms: or more correctly, it is always important to ascertain how far the nervous centres and vascular system are participating in a disorder. A number of symptoms, very variable and difficult to be described, announce general nervous sympathy and the degree in which it exists, but the connexion of the vascular system with a diseased state, is for the most part determined by the *pulse*,* i. e. by the beating of the arteries due to the propulsion of blood through them.

The artery which is generally examined for this purpose is

* Pulsus.—Lat.

the radial, which is of sufficient size, and passing near the surface at the wrist is most conveniently situated for examination. The frequency, quickness, force or resistance, volume, and any peculiar sensations given by the pulsation, are all subjects for observation, and contribute to the discovery of the nature, seat, and degree of disease.

Since the days of Galen, judicious and successful physicians have paid much attention to the pulse as a guide to correct diagnosis and practice, and although it is too common in this day to hear the inferences drawn from it decried as uncertain, yet the fact is, that to those who know how to interpret its communications, the pulse furnishes the most valuable of all our means of diagnosis.

In order to understand the morbid pulse, it is necessary to be well acquainted with its healthy conditions, for it is only by comparing its pulsations with the natural standard that we are able to detect morbid variations.

The pulse differs in frequency at different periods of life. In infancy it is much more frequent than in mature life, and becomes slower in old age. In infants* under two years of age the number of pulsations is above one hundred in a minute; in adult age, about seventy, and somewhat less in advanced life. These numbers, however, are susceptible of great variation. Whyt mentions a case where a healthy woman had a pulse of one hundred and twenty; and instances have been known where the natural pulse has amounted to only thirty-six or forty. The pulse of females is usually somewhat more frequent than that of men, and owing to the nervous sensibility of the gentler sex, is more readily excited by mental emotions, &c.

The healthy pulse is accelerated by exercise, and mental excitement. It is often more frequent in the evening than in the morning, after a full meal, or the use of exciting drinks, and in pregnancy. It is also often very much accelerated after copious evacuations, and under circumstances of great prostra-

* Some writers, as Billard and Valleix, assert that the pulse of young infants is not nearly so frequent as is generally supposed. See Chomel, General Pathology, p. 171.

tion. It is diminished by the horizontal posture, by rest, by moderate bleeding, and by the influence of certain drugs, such as digitalis and the tartrate of antimony.

Indeed, the frequency of the pulse is subject in so great a degree to the control of idiosyncrasy* and accident, that no positive inferences can be drawn from this solitary symptom, unless the *habitual* pulse of the patient be known. Chomel says, "I have seen a lady whose pulse during the paroxysms of intermittent fever did not beat above sixty per minute, to the great astonishment of her physician. This astonishment would have ceased had he counted the number of pulsations during the intermission, these being not above forty per minute."

Quickness and frequency are not synonymous terms. Frequency has reference to the number of pulsations in a given time, as a minute; quickness to the time required for the completion of a single pulsation. *Slowness* is opposed to *frequency*, not to quickness. Thus we may have a slow quick pulse; that is, one in which the beats in a minute are fewer than natural, but each particular beat is rapidly performed. For an opposite to *quick*, physicians frequently use *sluggish* or *labouring*.

The natural pulse is *soft* or compressible: that is, it readily yields to gentle pressure with the finger. The *hard* pulse is the reverse, offering considerable resistance to the obliteration of its channel by pressure. Tense, wiry, firm, &c., are used to express modifications of hardness.

Differences are also observed in the volume or size of the pulse. Sometimes it is *full* and *open*, at other times, small and contracted. It is called *regular* when the beats succeed one another in natural order, *irregular*, or *interrupted*, when the regular succession is broken by omissions of pulsations.

Certain conditions, too, are attended with peculiarities of the pulse. In aneurism of the heart, or large arteries, it imparts a peculiar thrilling sensation to the hand, which has more aptly, than is usual in such illustrations, been compared to the sensation which would be imparted by the passage of a fluid

* Idiosyncrasy—*ιδιος συνκρasis*—peculiar constitution.

through a shattered quill. Ossification of the coats of the arteries destroys their elasticity, and of course renders the pulse very hard. The hard pulse is usually attended by a peculiar condition of the blood, which when drawn and coagulated, presents a yellowish lymphous surface, which is called the buffy coat, with but few exceptions, a very important sign of inflammatory action.* The following precepts for feeling the pulse, though very minute, are nevertheless worthy the attention of those who are inexperienced in it. Long habit imparts to the fingers an extraordinary accuracy of sensation in this respect, but until it shall be acquired, it is not easy to form correct conclusions without all the care demanded by these rules.

The physician should wait until the patient has recovered from the emotion produced by his presence, requesting him to preserve absolute silence, and to remain in the sitting or horizontal posture. The pulse may be examined at the temples, lateral parts of the neck, arm, thigh, wrist, and wherever the arteries are sufficiently large and superficial; but the radial artery is generally preferred at the place where it ceases to be covered by the muscles of the forearm, opposite the radio-carpal articulation. If the patient be up, he should be placed in the sitting posture, if in bed, he should be upon his back, so that he may neither incline to the right nor left, and thus impede the circulation of blood in the arteries. The arm should be placed nearly in a state of extension, and sustained in its whole length, so that the muscles may be relaxed. The forearm should be nearly prone, that it may, upon the cubital edge and the radial edge, be a little raised. Care should be taken that no bandage or clothing impede the flow of blood in the axilla, at the elbow, or at any other point. All bandages should be removed so that there be the least possible compression. By means of these various precautions, we may be certain that there is no foreign obstacle to the flow of blood through this vessel.

The artery of the left side should be felt by the right hand, and vice versa: the four fingers placed parallel on the same

* The buffy coat is also seen upon the blood drawn from pregnant females, and persons under mercurial impregnation.

line, should be applied over the track of this vessel ; the index finger should be nearest the hand of the patient, and the little finger applied lightly, should be the first to receive the impulse of the blood ; at the same time that the four fingers are placed over the radial artery, the thumb, or rather the palm of the hand should rest upon the dorsal face of the forearm, thus affording solid support to the fingers by which the pulse is examined. The latter should at first receive a slight lateral movement in order to ascertain the situation of the vessel. When the fingers are all placed upon the artery, the pressure should be gradually increased and diminished several times in succession, so as to appreciate the influence of the pressure upon it, and thus more easily ascertain its different qualities. Twenty or thirty successive pulsations should in this manner be examined. It is not without advantage to examine the pulse in the two arms alternately, or at once : it should also, in particular cases, be examined in other places wherever it may throw light upon the diagnosis. It may be also examined several times, or at least a second time, before leaving the patient. However minute these precepts may appear, they cannot be neglected without inconvenience.—Chomel, Elem. General Path.

The inferences of pathological conditions to be drawn from the several above-mentioned differences of the pulse, will be explained, as far as the purpose of this treatise requires, when we come to consider particular diseases.

Pain is one of the most common and important symptoms of disease. It is this which usually gives the first intimation of disorder, and drives the patient to medicine for relief. It is very important that the physician and surgeon should know how to interpret this sign, and in order to this, much general knowledge of parts and symptoms is necessary.

An uninstructed observer naturally infers that the pain is always felt in the part diseased, and that its intensity accurately represents the degree of the disorder.

But such *prima facie* opinions are often very erroneous. We have already remarked, that a part may sympathise with a local disease seated in a distant and dissimilar organ. It also

happens frequently, that diseases of the nervous centres, and of the nerves themselves, occasion pain at the extremities of these organs of sensation, instead of at the point actually attacked. Violent pain in the nerves of the face may depend upon disease located in the brain or intermediate parts; and similar conditions are noticed in other nerves.

Nor does the degree of pain represent necessarily the degree of the disease which causes it. Some parts are much more sensitive than others, the most important organs being least sensitive. The quality of sensation does not necessarily belong to living bodies, but is distributed to the several parts, arbitrarily, yet with wonderful wisdom and mercy. Pain is intended to warn us of danger and compel us to preserve the integrity of the body; it is therefore set as a sentinel chiefly upon the out-posts of life, the external surfaces being much more sensitive than others; while those most carefully protected, are least profusely endowed with this watchful property. Hence it happens that the brain, heart, and lungs may be very seriously diseased without causing much, or indeed any local pain, while an unimportant injury to the eye or skin will create great distress.

The nature of the disease may often be guessed from the character of the pain, as it is burning, scalding, fixed, fugitive, darting, throbbing, &c. As pain does not point out with certainty the seat of the disease, and as its intensity does not necessarily indicate the degree of the change producing it, neither does its abatement or disappearance prove the relief or cure of the disorder. In many instances it certainly does so, but very often it does not.

Pain may be lulled by the action of causes which lessen the sensibility, as by narcotic medicines, by the exhaustion incident to protracted sufferings, by morbid conditions of the nervous centres, or the nerves themselves, or by absolute loss of vitality. It sometimes happens that the sudden cessation of violent pain is a most fatal symptom, as showing that mortification has occurred in the diseased part.

Pain is often intermittent and disappears only in obedience to a law of disease, not of health.

CHAPTER V.

TREATMENT OF DISEASE.

THE first step towards the cure of disease is to remove the cause which has produced it. Unless this can be done, we must be very much embarrassed in our efforts to relieve, inasmuch as the morbid conditions are continually liable to renewal. The impracticability of doing this effectually, forms the most serious obstacle to the successful treatment of many disorders. Children teething during very hot weather are subject to the action of combined causes, that often induce diseases which are very serious and very difficult to be controlled while the causes continue to act. Dead teeth remaining in the mouth may provoke a series of unpleasant and even dangerous evils, which cannot be removed while the cause of them remains.

It must not be supposed, however, that the removal of the primary cause of the disease will necessarily procure the subsidence of the disease itself. If a man pierce his flesh with a thorn, the wound will remain and may give great pain after the foreign body has been extracted; the effects of a wound from a bayonet or musket-ball may manifest themselves in serious and fatal disease long after the instruments of the injury have been withdrawn. The same truth holds good in all kinds of injuries by whatever class of agents they may be produced.

The absolute rest of a diseased part, when the nature of its function permits, and the least possible exertion of others, is very conducive to cure.

There are, however, certain exceptions to this rule. Certain morbid conditions of the articulations are improved by exer-

cise ; a particular mode of ocular affection requires the light, &c.,—but the exceptions are few and the rule general.

The *regimen* of the patient, that is his diet, clothing, exercise, employment, &c., require judicious management.

Finally, the most important part of treatment consists in the skilful application of therapeutical agents, and surgical means ; but of this part of the subject I will treat particularly when considering special diseases.

CHAPTER VI.

NATURE OF DISEASE.

MANY of the morbid alterations which seem to constitute disease, or cause symptoms, have been observed upon the living and the dead subject: many others have as yet escaped detection. We are unable, therefore, to compose a full list of these different conditions of parts, but those which are of common occurrence, and are well ascertained, may be described as follows:

1. Redness, swelling, and loss of cohesion of tissues. This is the most common of all modes of alteration, and is the cause of a large part of the disorganizations observed in tissues: it is called *inflammation*.* The local symptoms of this condition are heat, redness, swelling, pain, and diminished, altered, or suspended function. The general symptoms are *pyrexia*, or *fever*, of a particular type, seemingly connected with altered state of the blood.

2. Stuffing or engorgement of the veins, or congestion. The symptoms are not so well defined as in the first kind of affection. The local suffering is generally much less, though when certain organs, such as the brain and heart are the seat of congestion, the pain and discomfort are often very considerable. The function of the congested organ is greatly embarrassed or altogether suspended. The general symptoms are commonly such as mark diminished action.

3. Red indurations; vegetations; fungi, polypi.

4. Vesicles, pustules, suppuration, erosion, ulceration, perforation, gangrene.

* Inflammation—*flamma*, a flame. *Uup*, fire—from the burning sensation and heated appearance of patients in fever.

5. Thickening, granulations, thickness of tissues naturally transparent, adhesions, effusion of serum, false membranes.

6. Conversion of one tissue into another.

7. Gray induration, gelatinous degeneration, tubercles, encephaloid matter, cancerous matter.

8. Contraction, dilatation and complete obliteration of natural canals.

9. Accidental canals, fistulas, accidental tissues, cysts.

10. Development of gas in cavities.

11. Living bodies in organs.

12. Effusions of blood, collections of blood.

13. Chalky, stony, hairy, horny, and melanotic* production.

14. Changes of form and relation, wounds, ulcers, distension, lacerations, ruptures, fractures, and dislocations.

15. Foreign bodies.

16. Vices of formation.†

The fluids of the body, especially the blood, are doubtless capable of undergoing change primarily, and communicating distress and disease to other parts. But the pathology of the fluids is but very little understood. The same may be said of the nervous matter, of the nature of which we know nothing.

The above catalogue is therefore very defective, as it takes no notice of some of the most common and most important of all diseases, such as fever; and describes as diseases, conditions, which are only incidental to other previous and more important phenomena. Nevertheless, it is as accurate, or nearly so, as the present state of medical science will permit.

It is my purpose to select from this list such pathological conditions as are particularly connected with the pursuits of the dentist, omitting none, which, even in a remote degree, concern him, and passing by those in which he has no professional interest.

* Μελας—black.

† Roche & Sanson. Path. Med. Chir.

INFLAMMATION.

The most common, and for several reasons the most important of all morbid conditions, is one which is characterized by redness, swelling, pain, and increased heat. This is called inflammation, and may occur in any parts naturally possessing sensibility. Alteration or suspension of the natural secretions is a constant attendant upon inflammation, and when seated in organs which do not secrete, it arrests, or more or less embarrasses, the performance of their functions. The redness of an inflamed part is caused by the presence of red globules in small vessels which naturally carry only the serous or white part of the blood, and frequently, in addition to this, to the escape of blood from ruptured vessels and its deposit in surrounding tissues. This is called *chemosis* or *ecchemosis*.*

The presence of red globules in the serous vessels, or capillaries seems to be the essential fact in inflammation; the other phenomena being apparently consequent upon this error of circulation. It has hence been the anxious desire of pathologists to ascertain the cause of this irregularity, in hope that such knowledge might lead to more sure modes of relief. It is not my purpose to recapitulate the several theories, which have been constructed by learned and ingenious men, in order to explain the phenomena of inflammation. The condition thus named is compatible with very different states of the general system and also of the tissues immediately concerned, and therefore no statement of the pathology, and no plan for treating this form of disease, can be uniformly correct. All pathological conditions attended by heat, redness, swelling, and pain, are considered inflammatory, whether the parts immediately concerned be in a sthenic† or asthenic state.

Theorisers upon inflammation have been much perplexed to reconcile the distension of the capillaries with the apparently excited state of the parts: for distension or yielding of the walls of the vessels being connected in their minds with the

* *Ex*, out of. *Χημος*, humour. † *Σθενος*, strength.

idea of force overcome, or of relaxation, they suppose, that in inflammation the capillaries are less active and resistant, or in other words, comparatively *passive*; such being the case, it appears rational to use exciting applications in order to arouse the capillaries to exertion, so that they may empty themselves of superfluous blood, and resist the influx of unusual quantities of that fluid. The fact is, however, that the capillaries expand when excited, and thus draw to themselves an additional amount of blood, by a simple hydraulic law. They are not passive, because distended; but are distended in consequence of activity. Familiar examples will show the truth of this opinion. If the cheek be held close to a burning body, the skin will be reddened; in other words, the effect of the stimulus will be to dilate the capillaries, and attract to them a large volume of blood, suffering red globules to enter their canals. On the other hand, if cold water or ice be applied to the skin, it grows pale and shrinks, showing the contraction of the capillaries when their activity is diminished. The erectile tissues furnish us with an example of the operation of a similar law.

The *swelling* of an inflamed part depends upon the presence of an unusual amount of blood in it, and upon the effusion of serum, blood, lymph, or pus, consequent upon the engorgement.

The cause of the pain in inflamed parts is not very plain. At first sight it might appear to be due to the mechanical distension, but a moment's reflection will enable us to perceive that such cannot be the cause, for we may subject healthy parts to engorgement and distension, causing redness and swelling without pain. A string tied around the finger will cause the extremity of the organ to swell exceedingly, and become lividly red, yet this condition is not attended with pain, while inflammation of the same part is extremely agonizing.

That the distension of parts is connected under the peculiar circumstances accompanying inflammation with the pain produced, is obvious, however, in the disproportionate amount of

suffering experienced between loose tissues, and those which from nature or situation, admit of little freedom of expansion.

Doubtless the morbid condition of the nerves of the part, is the primary cause of the pain.

The pain of inflamed parts is so much modified by peculiarity of structure as often to enable the observer to distinguish the seat of the disease by the character of its sensation. As a general rule, the external parts are the most sensitive. The skin when inflamed is affected by a burning or scalding sensation, often intermingled with itching, even more distressing than the burning itself. The inflamed mucous membrane partakes of this sensation, though generally in less degree, unless in superficial situations.

The serous membranes when inflamed, cause a sharp, darting, lancitive pain. The pain of the cellular membrane under similar circumstances, differs very much according to its position and relations. When in connexion with the skin, it partakes of the pungency which characterizes the inflammation of that sensitive organ; when the cellular structure of the internal viscera is inflamed, the pain is usually dull, or obtuse, in consequence of the manner in which these viscera are supplied with nerves.

When nerves are the seat of inflammation, very acute, darting pangs are felt, and the surrounding structures are generally very sore, tender, and more or less inflamed. When the muscles are inflamed, the sensation is aching, mingled with a feeling of fatigue. The pain is greatly aggravated by motion. Inflammation of ligaments and bones, causes sensations not very different.

Pain is more or less severe in proportion to the degree of the inflammation, and is also much modified by peculiarities in the nature of the disease, and the condition of the parts affected. Certain specific affections, such as cancer, occasion a peculiarly distressing, darting, and burning pain: slight inflammation of the pulp of a tooth produces intolerable agony, &c.

Pain does not always proceed from inflammation: it may

attend very opposite conditions. Ice held upon the skin will cause great suffering.

The secretions of organs are very materially modified by inflammation. If it be slight, the natural secretion may be slightly increased, more often with increased secretion there will be an obvious alteration of it. Sometimes it is thinner and acrid, reddening, or excoriating the parts over which it flows: sometimes it is thicker, and more tenacious, often, especially if the inflammation be severe, it is much diminished, or altogether suspended. An abundant discharge of thickened secretion often precedes, and seems to be the means of relief to the inflamed parts.

It has become common to designate inflammation of the different parts by attaching the common termination "*itis*" to the Greek name of the part affected. Thus, stomatitis indicates inflammation of the *στόμα*, stoma, or mouth—gastritis, of the *γαστήρ*, gaster, or stomach. Sometimes the suffix is added to a Latin name, as conjunctivitis; in some instances, terms descriptive of inflammation, have become so firmly fixed in our nomenclature as yet to be continued, though as exceptions to the rule. Thus, pneumonia signifies inflammation of the lung; rheumatism, of the muscles. The term myitis is sometimes used instead of rheumatism.

Inflammation occurs in two very distinct forms, called Phlegmon and Erysipelas.

Phlegmon is the common form of healthy inflammation in organs composed largely of cellular tissue. It generally results from some local cause, as a blow, pinch, or other mechanical injury, or from the irritation of acrid matters, or foreign substances. Sometimes, however, it depends upon constitutional causes.

When phlegmon is seated in the subcutaneous cellular tissue, it presents a hard, circumscribed red tumour, which is generally very painful. At first, the sensation is burning and darting, subsequently, as the tumour softens, throbbing, or pulsating. After a longer or shorter time, according to the intensity of the inflammation and nature of the affected parts,

fluid is felt to fluctuate in the tumour ; in other words, an abscess filled with pus, has been formed, the skin ulcerates, the matter is discharged, and the cavity is obliterated.

What is called a boil is the best example of genuine phlegmon. It is a possible thing for a phlegmon to terminate by resolution, but this very rarely happens, unless the incipient inflammation be actively combatted by the resources of art. In by far the greatest number of cases the best treatment fails to prevent suppuration, after the phlegmonous tumour has been fairly formed.

Circumstances of position may vary the phenomena of phlegmon. If it be seated in important viscera, the constitutional symptoms will predominate very remarkably over the local distress : if it be formed under aponeuroses or muscles, the tension occasioned by the resistance of these unyielding tissues greatly aggravates the pain while it prevents the swelling. The matter not being able to escape is extravasated among the adjacent tissues and communicates irritation and inflammation as far as it reaches. Ultimately an opening may be made at a distance from the seat of the abscess : the pus may traverse a tortuous channel, the cavity not being properly emptied, may first heal, and a *sinus*, or *sinuous ulcer*, may be the consequence.

The pathological characteristic of phlegmon is the effusion of coagulable lymph, by which the inflamed parts are walled in, and the pus confined within the cavity and made subject to those obscure and curious processes by which it is ultimately evacuated. It is this limitation which gives to phlegmon its hard, resisting character, and which by impeding the circulation, causes the deep red hue which does not disappear upon pressure. To the same distension of vessels is due the peculiar pain of these inflammatory tumours.

When phlegmon is deeply seated its presence is often attended with an oedematous appearance of the surface,—an observation worth noting. The period of suppuration, even in superficial abscesses, is often marked by rigors, or chilly sensations. In deep-seated abscesses these rigors are still more remarkable.

After matter has formed, the pain abates, and assumes a heavy, throbbing character.

Erysipelas* is peculiar to the skin, and mucous membrane, and is far more usually met with in the former organ. It differs from phlegmon particularly in this, that it is not circumscribed by lymph barriers, but is diffused until gradually lost in healthy parts. The effusion which occurs in erysipelas is serous. When the skin only is affected, the serum is effused under the cuticle, and occasions vesications. Sometimes the cellular tissue beneath the skin becomes inflamed together with it, and putting on its own phlegmonous condition, though imperfectly developed, forms a compound disease, which has been called phlegmonous erysipelas. The effused serum, and unhealthy pus, diffused through the loose cells of the cellular tissue, carry destruction to this substance, far and wide, among the muscles and beneath the skin, while the latter organ ulcerating, and sloughing rapidly, gives way before the advancing inflammation.

This aggravated affection takes place in persons of debilitated constitutions, and as the result of wounds, and specific poisons.

In erysipelas, the circulation of the skin is not impeded, and therefore the pressure of the finger on the skin temporarily removes the red colour. The pain is burning, or stinging.

Simple erysipelas does not tend to form pus, but ends by resolution or effusion. The constitutional symptoms attending it, are generally much more serious than those resulting from phlegmon.

INFLAMMATORY FEVER.

Fever,† or pyrexia,‡ is a morbidly increased activity of the heart and arteries, the proximate cause of which is little under-

* Ερεω, I draw : Ηελας, near; from the tendency to involve surrounding parts.

† Ferbeo, I burn.

‡ Πυρ, fire.

stood, but which is attended with general disturbance of function.

Merely increased action of the heart and arteries is not fever, for such excitement may be purely physiological and attended with no functional distress. Violent exercise and mental emotions will frequently cause the vascular system to work with vastly greater energy than usual, while the individual who is the subject of the accelerated circulation will not be at all morbidly affected.

But in fever, the increased vascular action is the effect of disturbing morbid causes. Often, perhaps always, the blood itself has undergone change, and the vital fluid thus altered, being supplied to all the organs, begets universal disorder of function.

Fever is either idiopathic,* or symptomatic.

By idiopathic fever, we mean that form of it which appears to us to present the primary, or original disorder, being the first observable effect of the morbid cause. Such fevers are not, so far as we know, preceded by a local disease, whose existence and intensity are represented by the vascular action. We cannot, in the present state of our knowledge, go behind the fever to find out its immediate cause, structural change, or functional error.

Symptomatic, or secondary fevers, or as they are often called, from the nature of the conditions they most frequently represent, inflammatory fevers, are merely consequent upon local disease, having no independent existence, but rising and falling with the flow and ebb of the disorder they represent.

These two conditions, though called by the common name, fever, are entirely distinct and different in their cause, nature, progress, and treatment, and are only allied together, by the fact, that each of them is attended with morbidly increased vascular action.

Neither is symptomatic fever a unit; for when it represents inflammation, it differs essentially from the vascular condition which is consequent upon another state, which is called irrita-

**Idios*, proper, or peculiar, *Παθος*, disease.

tion, and which seems to consist in a merely augmented sensibility of a part, and the distress occasioned through it.

The sensible peculiarity of inflammatory fever consists in two elements : the hardness of the pulse, and the *buffy coat* of the blood.

In all kinds of fever the pulse may be quick and frequent, but as a general rule, to which the exceptions are very few, we may regard hardness as indicative of inflammation.

When blood is drawn in a full stream from the veins of a patient labouring under inflammatory fever, it will, upon coagulation, present a fibrinous surface of a yellowish hue, the abundance of which will, to a great extent, mark the intensity of the inflammation it represents. Very often, too, it will assume a peculiar form, being depressed in the centre, and raised at the edges ; an appearance which is called "cupped," though the resemblance is nearer to a saucer.

It generally happens that this appearance is more manifest after the disease has progressed several days than in its incipency ; and is often more observable upon a second, than a first bleeding, a fact which has led to the very erroneous opinion, that the abstraction of blood favoured this kind of alteration. The best mode of observing this buffy coat is to catch the current of blood in a deep narrow vessel, such as a wine or jelly glass.

Inflammation of fibrous tissues produces more of the buffy coat than is found consequent upon the same disease in other structures.

It must be remarked, however, that the buffy coat is found upon healthy blood drawn from pregnant women. It is occasionally, but rarely met with when the circulation is morbidly active from other causes than inflammation. Mercurialization also imparts this appearance to the blood.*

* The author had one patient, labouring under slight enlargement of the heart, whose blood always presented a buffy coat. In a somewhat extensive practice of nearly eighteen years, he has never found the blood of an inflammatory patient without it.

THE CONSEQUENCES OF INFLAMMATION.

Inflammation never continues long without the supervention of certain results, often of greatly more importance than the phenomena we have described. When it passes away without consequences, we call the process *resolution*.

The consequences, or as they are sometimes considered, the accidents of inflammation, vary according to the degree of its violence, the nature of the part, the general health of the patient, &c., &c.

The consequences of inflammation are chemosis, œdema, suppuration, vesication, ulceration, permanent alteration of texture, caries, and gangrene or mortification, or the absolute death of a part. Sometimes, also, by the effusion of a plastic substance, called lymph, adhesion is formed between surfaces, naturally, or artificially, separate; but as this adhesive inflammation is more often a reparative and conservative than noxious process, we will not include it among the consequences before mentioned.

Chemosis is the extravasation of blood in the progress of inflammation. This is not a mere mechanical fact, for the blood under these circumstances is evidently changed from its ordinary condition. It is no longer coagulable, and remains in the tissues into which it has escaped until absorbed; which is often a very slow process.

Edema is the extravasation of the serum or watery parts of the blood. It is apt to attend debilitated conditions, and seems to mark a lax condition of the coats of the vessels by which it is exuded. It is generally found in loose cellular structures, where the looseness of tissue affords little support to the walls of the vessels. It often attends a very low degree of inflammation, in debilitated subjects, and is unfavourable to recovery; rather as a sign of debility than from any evil which it is likely to cause. Edema may exist without inflammation, as when the veins fail to return their blood in due proportion to the rapidity of their supply, either because of mechanical pressure, disease of the heart, or any other cause. Edema

also attends certain specific conditions, as scarlet fever, and may be produced by medicinal agents, as arsenic. When œdema is general, it is called "anasarca."* It is readily detected by the bloated, translucent aspect of the skin, and by its loss of elasticity observed by pitting under pressure.

Vesication, or blistering, is the effusion of serum under the cuticle and rete mucosum, elevating them above the level of the surrounding surface, and separating them from the cutis vera. This may occur as the result of topical applications of an irritating kind, or, in consequence of local or constitutional disorders. This condition is frequently produced as part of medicinal treatment, and gives the name of vesicatories to a class of means employed for this purpose.

Suppuration, or the formation of a peculiar fluid substance called pus, is one of the most common and important of the consequences of inflammation.

Pus, when pure, is thick, cream-like, yellowish, of a faint and peculiar odour, and somewhat sweetish of taste. It is not at all irritating. To this kind of pus, the terms "laudable" and "healthy" have been applied. That which is thin, dark, and irritating, being considered unhealthy, because of the indication it affords of the bad condition of sores, &c., which secrete it.

Although it is true that such pus as is called "healthy," indicates a convalescent state of an ulcer, or abscess, yet the inference to be drawn from its appearance attaches exclusively to the parts which secrete it: while it may herald the abatement of local inflammation, it may, nevertheless, give clear evidence of a state of disease incompatible with the integrity of organs, or with life itself. Suppuration of the eye, of the liver, or of the lungs, would be a very serious matter, however "healthy" the pus might be.

Some writers have considered suppuration a curative process, and have regarded the pus as a very valuable covering for the granulations, or growth of new flesh.

Although it is true that suppuration often intervenes be-

* *Ανα σαρξ*—throughout the flesh.

tween inflammation and cure, and that the painful symptoms of inflammation abate or disappear after the copious secretion of pus, yet we must regard the formation of this matter, however pure, as a great evil, though certainly preferable to others which occasionally affect inflamed parts, and it is one of the greatest cares of the surgeon and physician to prevent it.

Pus may form in several situations. First: it may be found free upon the inflamed surfaces of parts, as the skin, the eye, and mucous membranes, without any other apparent change of organization than an increase of the natural vascularity. Secondly: on the naturally unexposed surfaces of the body after they have acquired a new organization, by increase of red vessels, and usually, if not always, by the addition of coagulable lymph; for it may be questioned, whether in any instance the surfaces of the cellular, synovial, serous, and medullary membranes, the pia mater, or periosteum, can furnish genuine pus, without the deposition and organization of some coagulable lymph. The third situation in which pus is generated is the surface of the peculiar structures called granulations, the vascularity of which exceeds that of all the natural surfaces of the body. The pus formed on the granular surface of an ulcer is the best example of this kind.*

Some parts of the body have a much greater disposition to form pus when inflamed, than others. The cellular tissue, skin, and mucous membrane are very prone to suppurate, while the fibrous tissues manifest no disposition to it.

Pus is modified by the nature of the part where it is formed, by the constitution of the individual, by various accidents, occurring in the process of its formation, and by certain obscure laws, which control the phenomena of those affections which are called specific. It will also present different appearances, as it may be mixed with other fluids, as blood, saliva, bronchial mucus, &c.

If pus mixed with blood, serum, &c., be long confined under

* Macartney on Inflammation.

dressings, or in cavities, it becomes very offensive, and often irritating. If it be produced from the irritation of diseased bone, it is also very fetid. When thin, mixed with blood, and evidently "unhealthy," it is called "sanies."

When pus is irritating, it is so, not to the surfaces which secrete it, but to the adjoining healthy structures over which it flows.

Pus is heavier than water, and this quality frequently enables us to distinguish it from mucus. It is coagulable by muriate of ammonia, which Mr. Hunter considered a peculiarity sufficiently marked to distinguish it from mucus, and all other natural secretions, but the accuracy of the test is disputed.

From the fact that hard inflammatory tumours in the course of inflammation become soft and yielding, and filled with pus, it was naturally supposed that the original solid parts were converted into this fluid. It is now well ascertained that such is not the case, but that pus is secreted by the arteries.

When pus is enclosed in a cavity formed in the progress of inflammation, the condition is called abscess.*

The phenomena of abscess are very curious, and through them, nature succeeds in relieving the body of foreign matters, and repairing extensive injuries.

When a part capable of suppuration is subjected to inflammation of the required intensity, some of the small vessels give way, and blood is effused into the surrounding parts. Simultaneously with this rupture, or nearly so, the arteries begin to throw out a peculiar plastic matter, which is called coagulable lymph. This is capable of becoming organized, and being thrown round the diseased parts, and between them and those which are healthy, it forms a barrier to the infiltration of extravasated fluids. By some strange process, to us altogether inscrutable, the walls of lymph become vascular, and capable of performing the vital functions of secretion and absorption, and by them the pus is furnished. As this secretion proceeds, the previous contents of the abscess, including the effused

* *Abscedo*, I depart, denoting the loss of substance.

blood, are gradually absorbed, and fresh pus deposited in their stead, so that, if the tumour be opened at an early stage, the pus will be more or less mixed with blood, but if the opening be delayed, the cavity will be found to contain only pure pus. The process of suppuration is announced by some relief of local symptoms, and a change in the character of the pain. It loses its *burning* sensation and becomes *throbbing*, at the same time, the tumour becomes softer, and at last fluctuates readily under pressure of the fingers. Very often, and especially when the disease is extensive, or when it is seated in the viscera, the formation of abscess is announced by shivering or chill.

While the arteries of the walls are depositing the pus, other processes equally obscure are moving the abscess towards the surface, and preparing for its evacuation. The bottom of the cavity is constantly contracting and filling up, while the opposite side is thinning and expanding. The absorbents at one side of the abscess are busily engaged in removing matter, while the arteries at the other, are as actively supplying new material; at the same time, a temporary organ, made for the occasion, faithfully performs its peculiar functions, supplying pus, and removing mixed fluids from the cavity.

The parts lying upon the summit of the abscess are rapidly thinned, the tumour is pushed towards the surface, the skin ulcerates, an opening is made, and the pus evacuated. Though an abscess may discharge itself anywhere, there is evidently a strong disposition in such tumours to find their way to the outside of the body. In order to effect this, they will often traverse dense opposing structures when a nearer opening through more yielding tissues might readily be effected. Sometimes when an abscess occurs in an important viscus, artificial adhesion will be formed between its surface and an adjoining structure, and a continuous canal being pierced through, then the pus will be ejected upon the surface of the body, or into another organ which has external communications.

These most curious and interesting facts are so conclusive of wonderful design and contrivance, that it is impossible to

regard them in any other light than as manifestations of divine and superintending Providence.

Foreign bodies are removed precisely in the same way as pus. When the abscess has reached the surface, a thin *point* appears, which is soon perforated by a very small opening through which the pus slowly oozes. The appearance of this thin projecting spot is called "pointing."

Sometimes the parts which surround the abscess are too dense to permit the passage of the matter. When this is the case, great pain is often caused by the pressure, and the irritation produced by the vain efforts of nature to relieve the parts may occasion very serious disease in adjoining structures. In some instances of this kind, as in abscess of the gums, or gum-boil, the pus failing to be evacuated, is ultimately absorbed.

When the attempt is made to form an abscess by weak or scrofulous constitutions, and in situations where the cellular substance is lax, the progress of the disease is very different. The first extravasation is serum, which passes easily into the loose cells of the cellular membrane with little or no injury to their structure. The parietes of the tumour are not composed in the beginning of organized and vascular lymph; no genuine pus, therefore, is found in such cavities in the first instance; the fluid they contain is serous, mixed with coagulable lymph; parts of which are found as flakes floating in the serum. As the cavities of chronic abscesses are not provoked, either by severe tension, or the quality of the contained fluid, there is no preparation made for some time to remove their contents. These collections, therefore, often traverse a considerable distance along muscles, or under plates of fascia, before they arrive at the skin, which ulcerates very slowly; after which, the cavities may inflame, their interior surface become more highly organized, and secrete genuine pus.*

Ulceration is the process by which solutions of continuity are effected by vital processes, and open secreting sores pro-

* Macartney on Inflammation.

duced. Inflammation is by no means necessary to this result, and some of the best writers upon pathology have declined to recognise it as one of the consequences of inflammatory action. Nevertheless, as ulceration does frequently occur in the progress of inflammation, and is an evil to be guarded against by the dental practitioner especially, it seems proper to consider it in this connexion.

The process itself is very curious, and at first sight, the facts explanatory of it are hardly credible. It is not easy to comprehend how a body can destroy itself and take itself away, and the difficulty is not solved by the fact, that only small portions are thus removed. Yet, there can be no doubt that such is the case, and we may silence, if not satisfy, the objector, by suggesting the equal difficulty of understanding how parts form themselves; both facts, as Mr. Cooper observes, are equally well confirmed.

Every part of the body is continually undergoing waste and reparation. It seems that the molecules of tissues are constantly becoming effete, and having undergone some mysterious change, are taken up by the absorbents and carried off to the several waste gates of the system, from which they are ultimately discharged. The bowels, the kidneys, the skin, the lungs, all the *emuntories** are continually at work, and all ultimately discharging the debris of the system.

At the same time that this disintegration is going on through the action of the absorbents, another set of vessels, the nutritive arteries, are everywhere depositing new matter. Bone receives bone, muscle is supplied with muscle, and viscus with its peculiar organic matter, so that the integrity and form of each part, and of the whole, are exactly preserved. By some wonderful and inscrutable law, the balance of supply and demand is equally adjusted, yet not so positively as to lead us to infer that the action of the one set of vessels regulates that of the other. In childhood, the supply exceeds the waste, and the body grows; in maturity, the supply is regulated more by

* *Emungere*, to cleanse—any organ whose office it is to discharge excrementitious matter from the system.

the wants of the man than the activity of the absorbents. If his vocation calls for increased strength of arm, the very use of the organ, instead of consuming, augments its volume.

In truth, the two sets of vessels seem to be independent of one another, yet, like other parts, they naturally work together for the production of the phenomena of life.

It will readily be perceived that if any circumstance should increase the activity of the absorbents of a part beyond what is usual, and should not simultaneously stimulate the nutritive vessels; or, should any circumstances render parts unusually susceptible of absorption, that the result would necessarily be an obvious loss of parts, and the interruption of their continuity. It is also obvious that the converse of these conditions would be attended with similar results; for if nutrition be impeded, either through defect of supply, or any cause rendering the part less capable than usual of converting blood into its own tissue, loss of volume, and breach of continuity might occur.

Ulceration may result from any of these causes. Pressure is a common cause of ulceration, and acts probably by interrupting the circulation, and nutrition of a part. Pressure may produce absorption and waste without causing ulceration, and the dentist when fixing artificial pieces in the mouth must be careful so to adjust his plates and springs as to avoid both of these evils.

Inflammation probably produces ulceration in a manner somewhat similar; viz., by causing such impediment to circulation, as prevents nutrition from being properly performed. It is also probable, that the blood itself undergoes changes under the influence of inflammation, which render it less capable of supplying the loss of parts.

Diseased parts, and those which from any cause have become useless, and these only, are liable to be wasted by absorption. Unhealthy products, such as fungus,* are often removed with wonderful rapidity, and even bone will be removed when, being

* Fungus, a mushroom; proud flesh.

no longer needed, it has become foreign matter. The roots of the deciduous teeth are thus entirely removed, and the dead fangs of permanent ones are subjected to continual waste from the same cause. That they too are not entirely removed, is due to the comparative shortness of time which the present term of human life allows for the process, rather than to any resistance they are able to offer to the action of these all-subduing lymphatics.

Extraneous substances are generally removed by ulceration. Thus, a ligature will be separated from an artery, or a foreign substance from a wound: no more of the surrounding substance being absorbed than is necessary to loosen and dislodge the intruder.

By ulceration, also, dead parts are separated from the living, and the decomposed fragments removed to make room for new matter.

Sometimes ulceration seems to produce great devastation, and is then called *phagedenic*.* In such cases, it is evident that the ulceration is only the consequence of the destruction, not the cause, for, until the parts have become too much enfeebled to subserve their natural purpose, they will not be subject to this rapid absorption.

Adhesion is often consequent upon inflammation, though like ulceration, it is not always dependent upon inflammatory action. It is a process by which nature unites parts, either naturally separate, or artificially divided. The bond of union is coagulable lymph.

This process is of immense importance, in checking hemorrhage, closing fissures, and in providing means of safe transit for pus from the viscera to the surface.

Both of these processes are sanatory. Mr. Hunter calls ulceration the natural surgeon, and declares that even in the spreading of an ulcer, there may be considerable advantage; and another writer very properly observes, that the same remark would apply to the effusion of lymph. The one acts like the surgeon that unites parts; the other like the one who

* *Φαγω*, I eat.

removes them, because they are not fit to remain ; and it would not appear more justifiable to call adhesion and ulceration inflammatory processes, than to consider the operations of surgeons themselves as particular modes of inflammation.

Inflammation may result in a permanent change of structure. Parts may become denser and harder, or, *indurated* ; sometimes certain structures, under the influence of slow inflammation, are *softened* ; sometimes a permeable cellular structure, as the lungs, becomes changed into a dense impermeable tissue, like liver, or *hepatized* :* and sometimes accidental inflammation begets, in persons and parts inclined thereto, morbid growths of a specific character.

The most disastrous result of inflammation is the absolute death of a part, reducing it to the condition of a foreign body, and subjecting it to the play of chemical affinities.

When this takes place in soft parts, it is called gangrene or mortification ; in bones, necrosis. The dead soft part, when separated by ulceration from its connexion with living parts, is called *sphacelus*, † or *slough* ; a fragment of dead bone is called *sequestrum*. ‡

Caries is a condition of bone somewhat analogous to ulceration of soft parts. Caries of the teeth is the result of chemical agents acting from without, and decomposing their structure ; they are, however, subject to necrosis, as other bony tissues, and the fact of their being liable to a peculiar erosion, does not probably exempt them from the kind of caries observed in similar structures. If, however, such idiopathic caries does occur in the teeth, it must be very rare, and is always confounded with the erosive caries peculiar to these organs.

* *Hepar*, the liver.

† Σφάζω, I destroy.

‡ *Sequestro*, I separate.

CHAPTER VII.

INFLAMMATION OF THE SEVERAL PARTS COMPOSING THE MOUTH,
AND OF THE PARTS ADJACENT.

THE mouth is very complicated and exquisitely organized. It subserves a variety of very important purposes. Speech, mastication, insalivation, taste, inhalation, and expiration, are all performed in this small, but admirably constructed cavity. Such numerous and complicated functions require the presence of various and delicate organs closely packed together, and a large endowment of nerves and blood-vessels. Glands are hidden in every part of the walls of the cavity; their ducts perforate its floor, and open on its sides; nerves and blood-vessels, of extraordinary size, creep along every bony channel, and spread in expanded network over the whole surface; while the mucous membrane, with its innumerable crypts and follicles, covers the whole, and connects every sentient part with the sympathies of the external and internal surface.

Into the cavity thus constructed, and thus exquisitely endowed, air of different temperature is constantly rushing; food and drink of various kinds are received; secretions are poured out, remains of aliment and of the natural fluids undergo change, and medicinal agents of various kinds are made to pass.

Besides all this, the mouth is the seat of the extraordinary process by which two sets of teeth are matured and evolved, and one of them removed by a physiological, and the other, to a greater or less extent, by a morbid disintegration. Under these circumstances, it is not wonderful that inflammation frequently occurs in the mouth, and that it should be attended there with severe suffering.

As the cellular tissue enters largely into the composition of

the structures of the mouth, the form of inflammation most common in that cavity, is what is called phlegmon.

Sometimes this form of disease occurs in the mouth, as the consequence of wounds, and even as an *idiopathic* affection. Sudden death is sometimes produced by the effusion of serum about the glottis—as the result of erysipelas affecting the larynx. This affection is called *œdema* of the glottis.

Phlegmonous inflammation frequently occurs in the glands of the mouth, the tonsils, the gums, the pulps of teeth, the lining membranes of the alveoli and antrum, and the tongue. Erysipelous inflammation in these parts is rare, but sometimes occurs in the mucous membrane lining the gums, cheek, and palate. The submaxillary glands often take on inflammation from the effects of cold, and from the irritation produced by the presence of diseased roots in the alveoli of the lower jaw. The pain and difficulty of mastication, with the swelling of the gland, readily indicate the seat and character of the disorder. Unless the inflammation be speedily subdued, and especially if it be the consequence of diseased teeth, the gland readily suppurates, discharging a very fetid pus, either into the cavity of the mouth, or externally, under the jaw. When the opening takes place internally, the flow of pus into the mouth is very disagreeable, and the access to, and lodgment of, alimentary matters in the suppurating gland often keep up the inflammation until an external issue is secured.

Removal of the diseased teeth generally causes a speedy cure. Of other remedial means I will discourse hereafter.

Inflammation in these, as in all glandular structures, is apt to leave permanent indurations.

Inflammation of the tonsils is of very common occurrence. Its most common exciting cause is cold. The inflammation is generally very acute, rendering deglutition, and even speech, very difficult, sometimes impossible. It is generally attended by severe constitutional symptoms.

Tonsillitis or cynanche* tonsillaris usually terminates by re-

* Cynanche, from κυων, a dog, and λυχα, I choke, is a name of a class of diseases of which obstructed respiration is more or less a symptom.

solution, but very often by suppuration. Permanent enlargement and induration often ensue upon repeated attacks of the disease, and the swollen tonsils sometimes offer serious obstruction to respiration. When this is the case, they may be removed with little difficulty, and without subsequent inconvenience. These little organs are also subject to a chronic inflammation and slow suppuration, which gradually waste them away. The palate and uvula are often the seats of inflammation. The latter is liable to erysipelas and oedema.

The parotid gland is rarely inflamed, except when it is the seat of a peculiar specific disorder, which is called cynanche parotidea, or *mumps*.

Inflammation of the lining membrane of the mouth is called *stomatitis*.

Simple inflammation of this membrane is characterized by increased redness, swelling, and heat, but it rarely occurs except in connexion with inflammation of the tonsils, larynx, or pharynx, or as the consequence of the irritation of dentition, or of acrid, or stimulating matters taken into the mouth for the purpose of allaying toothache. In such cases it terminates by resolution.

It is much more common to find this inflammation presenting the appearance called "*aphthæ*."*

These are grayish or whitish specks, which look like ulcers, and are described as such by some authors, but which are exudations from the inflamed mucous membrane; when these fall off, the parts beneath are red and irritable, the cuticle being peeled off, and the cutis vera exposed.

This disorder is generally supposed to indicate a corresponding disease of the surfaces of the digesting organs. It attends some forms of constitutional disorder, and constitutes a peculiar infantile disease, called thrush, of which I will have occasion to say more in connexion with dentition.

The gums are very liable to inflammation, which is characterized by redness, swelling, soreness, and often by very severe aching pain.

* *Ἀπτῶ*, I burn.

The most common cause of inflammation in these parts, is the irritation produced by dead teeth. We have already observed that dead parts are subject to the same laws which affect foreign bodies lodged in the flesh, and that nature removes them, or attempts their removal, by instituting inflammation and ulceration around them. In other words, it is provided in the fundamental laws of the animal economy, that dead parts shall irritate the surrounding parts, and produce in them those conditions which naturally lead to the expulsion of the offenders. But dead teeth are firmly set in the jaw, and withal, are of too dense structure to be readily softened and absorbed. It happens, therefore, that they remain long after their partial or complete disorganization, to plague the soft parts with which they are connected. The gums under these circumstances are kept in a state of chronic inflammation, and are rendered exceedingly sensitive to the action of irritants. Cold, or any local application of an exciting kind, will, under these circumstances, occasion aggravation of the chronic affection, and cause acute inflammation, of a severe character, which is remarkably liable to end in abscess.

The chronic inflammation is often attended with ulceration around the decayed tooth; the soft parts being separated therefrom, in the vain attempt of nature to remove them. In consequence of the long-continued and unavailing ulceration, an imperfect attempt is made by the vessels of the gums to supply the loss of parts by granulations. These are unhealthy, spongy, loose, and incapable of cicatrizing; in other words, they are *fungous*. These fungous growths bleed freely upon being touched with a brush, or hard body, and being constantly destroyed and renewed, add much to the fetor of the fluids of the mouth, which under these circumstances, is often intolerable. Inflammation of the pulp, and the lining membrane of its cavity is commonly, perhaps always, the consequence of caries of the bony structure of the tooth, and exposure of its sensitive internal parts to the action of external agents. It gives rise to violent pain, which only subsides to be renewed again by contact with any hard body, or irritating substance. This inflammation may continue for a considerable length of

time, passing through successive suppurations, and, ultimately, completely destroying the vessels and nerves of the pulp, and with them, the vitality of the tooth.

Sometimes the matter formed within the tooth perforates the alveolus and the gum, and forms a fistulous* orifice into the mouth, through which putrid fluids are continually weeping. This is what is called alveolar abscess, and can only be remedied by extraction of the tooth.

The matter of alveolar abscess will sometimes be discovered at a great distance from its source. The following case, which occurred in my practice, and which is related in Prof. Harris's Dental Surgery, as the most singular instance of alveolar abscess which ever fell under his observation, affords a striking instance of this fact.

The subject was a lady about thirty years old. She consulted me on account of a continual dripping of pus from behind the curtain of the palate, which she attributed to some disease of those parts, and which had annoyed her for a year previous.

Upon a close examination of her mouth and throat, I could discover no tumour or any indication of a deposit of matter except two protuberances, each nearly as large as a hazelnut, situated behind the two superior central incisors. Being strongly inclined to believe that the matter came from these abscesses, I requested the advice of Prof. Harris, who fully coincided in my suspicions. Upon our joint advice, the patient submitted to lose these valuable teeth, and was rewarded by the cure of the troublesome complaint which had caused her so much uneasiness.

The maxillary sinus, or antrum, is covered by a membrane which nearly resembles the mucous covering of the mouth. This is frequently the seat of inflammation. From the protected situation of this cavity, locked in on every side by bone, and covered by thick integuments, it is not apt to be affected by ordinary agents, acting from without, but the teeth of the

* Fistula—a pipe, a canal whose sides and edges are hard and incapable of adhesion.

upper jaw frequently send their roots into it, and thus affect it readily, when, happening to become diseased, they are qualified to provoke disorder in neighbouring parts. Even when they do not penetrate the floor of the antrum, they are often separated from it by a partition so very thin as to afford no adequate protection to the antral membrane against the propagation of inflammation.

When the membrane of the antrum is inflamed, it pours out a vitiated secretion, which accumulates for some time before it produces sufficient uneasiness to excite the attention of the patient. The pain of inflammation depends upon the degree of pressure to which the parts are subjected, and the peculiar structure of the antrum prevents much suffering from this cause until the cavity is completely filled.

Generally, however, some dull pain is felt in this region in the course of the inflammatory action, but the patient commonly refers it to the teeth. After a while, however, the distension of the walls of the cavity produces more serious suffering: matter escapes through the nose or mouth, and a hard bony tumour indicates the projection of the antral walls.

The fluid thus accumulated is usually not pus, but vitiated mucus. The disease has been very improperly called dropsy* of the antrum, for the contents are by no means serous.

The discharged matter, having been long retained, is generally very offensive.

Ulceration may also take place in the membrane of the antrum, and pus of a very fetid quality be exuded through the nose, and when an opening exists, through the mouth. This condition forms one of those exceedingly distressing, and often incurable cases of disgustingly fetid breath, which are called *ozæna*.†

Sometimes, when the disease is permitted to proceed without proper remedial means being used, the walls continue to swell, the bones soften, the tumour opens, and a fetid discharge flows through the aperture over the cheek.

* *Υδαρ*—water. Accumulations of extravasated serum are so called.

† *ὀσείν*, to smell.

CHAPTER VIII.

TREATMENT OF INFLAMMATION.

IN all cases of inflammation it is desirable to bring about the disappearance of the disease without any disorganization of structure. In other words, to accomplish cure by *resolution*. When this cannot be effected it is important to lessen suppuration, and if possible to prevent, or, at least, limit mortification.

The first step towards accomplishing the cure of inflammation is to remove, if we can, the cause which produces it. This will often render further treatment very simple and easy, or altogether unnecessary. Where the gums, or lining membrane of the antrum are inflamed through the irritation caused by diseased or dead teeth, no treatment short of their removal will do any good; and this will generally be a sufficient aid to nature. Even when the soft parts are suppurating, they will speedily heal after the irritant has been removed.

The treatment of inflammation proper, consists in general and local means. With the exception of a few employed to relieve chronic inflamed conditions, these remedial measures are comprised under the general name *antiphlogistic*,* and are all intended to lessen the vascular action, of the general or local circulation.

Antiphlogistic treatment is negative or positive. The negative consists in withholding every local application likely to excite the vessels, or irritate the morbidly sensitive nerves of the part; and preventing the taking of such drinks or aliment as would tend to sustain the morbidly active circulation. In short, the withdrawing as far as possible of all local and general excitants.

**Anti*, against; *phlogiston*, the old name for the cause of heat.

The positive treatment consists in the use of means which lessen vascular action and diminish nervous sensibility. The general remedies are bloodletting, purgatives, diaphoretics, and low diet; among the local are bloodletting, from the affected part, or its immediate vicinity; cooling, emollient, sedative, and astringent applications, and counter-irritants.

When pus has been formed in a cavity, it is often necessary to evacuate it by an artificial opening; sometimes, even after the tumour has opened spontaneously, a counter-opening is necessary.

TREATMENT OF INFLAMMATION AND ABSCESS OF THE PARTS
COMPOSING THE MOUTH.

It is rare that inflammation of these structures requires general treatment. Sometimes, however, it is sufficiently serious to occasion inflammatory fever, and call for decided constitutional remedies. When such is the case, the patient should be bled from the arm until a decided impression be made upon the circulation, and the operation must be repeated, until the desired effect be accomplished. If the bowels of the patient be constipated, saline cathartics should be employed. Nauseating remedies, such as tartar emetic, will also be found useful in lessening the general inflammatory action and withdrawing the nervous sensibility from the affected part.

In most cases, however, the dental surgeon will only need to employ local remedies.

We have already said that when the inflammation is consequent upon the presence of diseased teeth, or parts of teeth, they must be removed. This being done, the inflammatory action will commonly subside and speedily disappear.

The teeth are liable to a peculiar calcareous deposit, called tartar,* or salivary calculus, which adheres with great tenacity

* Tartar, or salivary calculus, is composed, according to Berzelius, of

Phos. lime and magnes,	79·00
Salivary mucus and saline,	13·50
Animal matter,	7·50
	<hr/>
	100·00

to them, and insinuating itself under the edges of the gums, detaches them from the teeth, and acting as a perpetual irritant, inflames, and often ulcerates them.

This substance is deposited from the saliva under certain conditions of that fluid, and is most liberally deposited upon the teeth nearest to the salivary ducts and upon those of the lower jaw. When it contains a larger proportion of earthy salts, it is hard, and brittle; when the animal matter is in excess, it is soft and moist. Under whichever of these forms it appears, its removal is indispensable to the successful treatment of the disease of the gums which it causes. Sometimes this can be effected by the brush alone; often the hard mineral substance requires to be broken up and elevated by an instrument of steel. When once removed, its subsequent accumulation must be prevented by persevering use of water and the brush.

It often happens that the gums will be inflamed through the agency of teeth, the disease of which is not sufficiently serious to authorize their removal; again, inflammation may occur in the gums from causes independent of the teeth, as from cold, irritating applications, bruises, &c.

In order to prevent acute inflammation of the gums from passing rapidly to suppuration, it is necessary to use free local depletion. This may be done by scarification, or by leeching.

Scarification is nothing more than slightly incising the gum and causing its superficial vessels to bleed.

It is a remedy of doubtful utility, and often does more harm than good.

It is obvious, that any wound inflicted upon an inflamed part must increase the inflammation to a certain extent, and unless the quantity of blood taken away be more than sufficient to counterbalance the additional evil inflicted, the patient will lose by the operation. Scarification produces copious bleeding for the instant, but the clean superficial wound is soon closed by coagulum and lymph, and the oozing of blood continues but a short time.

When the gums present the condition called fungus, scarification will cause much freer bleeding, owing to the increased vascularity of the part. Under such circumstances it is an important means of cure.

Leeching is a far more effectual process. It is true that wounds are made by the leeches deeper and more irritating than those inflicted by the lancet, but the flow of blood continues very much longer and the quantity discharged is far greater.

Two or three leeches placed upon a gum will often cause a bleeding which will continue for several hours, and will cure severe inflammation in almost as brief a space of time.

In order to be effectual, leeching should be employed in the early stage of inflammation. If delayed until matter has begun to form, no benefit can be expected, except, perhaps, in the lessening of the quantity of pus.

Other local applications are of little or no use in the treatment of acute inflammation of the gums. Their position prevents the continuance of any fluid upon their substance. Cold water, however, may be used by repeatedly filling the mouth with it. This remedy is serviceable only in slight inflammations. All stimulating applications used to irritate the surrounding parts and thus alter and divide sensation so as to relieve pain, ultimately aggravate the disease. It is erroneously supposed that the increased flow of secretions which is occasioned by the irritation, must relieve the vessels and abate the inflammation, for the very irritation attracts to these parts a larger supply of blood than usual, and augments secretion only by increasing arterial activity.*

Where the inflammation is excessive, leeching and blistering behind the ears or under the jaw may be resorted to.

As great and long-continued suffering frequently attends this disease, full opiates at night may be given with great advantage; securing at once temporary relief and grateful re-

* *Ubi irritatio, ibi fluxus*—where there is irritation, to that place will be the flow, is a well-known medical adage. The law applies to the nervous as well as the vascular system.

pose, and aiding materially the efforts of nature to remove the inflammation.

Inflammation from mechanical violence must be treated upon the same principles.

The gums are liable to inflammation of a *specific* character. When mercurial preparations have been used to a certain extent differing much in different individuals, a constitutional impression is obtained, which announces itself by a peculiar tenderness and inflammation of the gums and an increased secretion of mucus and glandular fluids into the mouth. This is called salivation or ptyalism.*

The first symptoms of this mercurialization are observed in an increased tenderness and some swelling of the gums, which exhibit a pale rose-colour, except at the edges surrounding the teeth, where they are of a deep red. The soreness and swelling now rapidly increase, the discharge of mucus and saliva becomes excessive; and is accompanied by a very peculiar and disagreeable odour; a metallic or *coppery* taste is constantly present in the mouth, and the tongue and salivary glands are inflamed and swollen.

Such is moderate salivation, but it sometimes happens that from excessive dosing with mercury, or from peculiar susceptibility of the patient, all the symptoms above enumerated are greatly aggravated. The gums are very much swollen and covered with ulcers; irritative fever appears; the enormous tumour of the tongue pushes beyond the lips and hangs out of the mouth, preventing the closure of the jaws; the flow of fluids is prodigious, the patient wastes excessively; gangrene of the mucous membrane of the mouth and gums, and extensive sloughing of the soft parts and bones sometimes occur; the teeth are loosened and sometimes drop from their sockets and occasionally the patient expires from exhaustion.

A very frequent consequence of extensive mercurial salivation and the attendant ulceration and sloughing, is contraction of the mucous membrane in the neighbourhood of the anterior

* Ptyalism—salivation; from πτυα, I spit.

arches of the palate, whereby the patient is prevented from opening the mouth, except to a very slight extent. In one case this condition resulted from salivation produced by a few grains of blue pill. The patient was unable to open the mouth wider than half an inch. Surgical aid could give only temporary relief. In another instance of a child four years old, the patient when seen several years afterwards, was obliged to suck food through the spaces left between the jaws by the loss of the alveolar process.*

It sometimes happens as a consequence of salivation, that adhesions form between the mucous membrane of the lips and cheek and that of the gums; very much deforming the face and lessening the usefulness of the mouth.

A great variety of remedies have been suggested and employed for the relief of excessive salivation, but there is no specific means of relief. No local applications of an irritating character can be borne, and no astringent but of the mildest quality can be used. Besides demulcent lotions and some very mild astringents, such as table tea, we have no topical applications to recommend.

The only rational treatment is to abate the inflammation by the use of antiphlogistics, to such extent as the strength of the patient will permit. Leeches under the jaws procure the greatest relief, and blisters to the throat and opiates are useful accessories.†

A form of disease very nearly resembling salivation, occurs occasionally in children, and sometimes it is said even in adults. It is ulceration of the inside of the cheek, causing gangrene and a copious secretion of fetid saliva. It is called *Cancrum oris*.

This disease is not properly inflammatory, being rather a consequence of debility; but lest I should not have an opportunity to describe it hereafter, I will do so now.

* Pereira's Elements of Materia Medica and Therap.

† It is important to remark that salivation, however severe, does not necessarily prove the previous administration of mercury. For some curious observations on this subject, see Pereira's Elements of Mat. Med. and Therap. 709.

Cancrum oris is a foul, fetid ulcer, beginning upon the inside of the cheek and rapidly sloughing through it until it opens upon the outside. The gums and alveoli are often seriously involved; the teeth become carious and loose, and drop out; abscesses form in different parts of the mouth, and make openings for themselves in different directions. The progress of the disease is attended by a copious discharge of fetid saliva and mucus. Exfoliations of the bone are not unfrequent and extensive sloughing sometimes occurs.

The disease generally occurs in ill-fed children, crowded in a hospital or living in low, swampy situations. The remedies must be tonic and invigorating. The principal, are fresh air and nutritious diet. The best local applications are diluted mineral acids; burnt alum, sul. zinc, tinct. of myrrh, &c.

The disease is exceedingly rare in our country.

Syphilis, or the venereal disease, often produces ulcerations of the throat, which are described in the many books upon that subject, and require no particular notice here.

It is proper, however, for dental surgeons to know that a peculiar and destructive ulceration of the gums, which will defy all but specific remedies, sometimes, though very rarely, attends Syphilis. As it is impossible to describe the peculiar appearance of this ulceration by words only, so as to enable the practitioner to detect it upon sight, I refer the reader to an excellent delineation of it in Messrs. Carey & Hart's edition of Rayer's Plates, Pl. xxiv., Fig. 15.

Chronic inflammation of the gums may depend upon any of the causes mentioned as productive of acute inflammation. It tends rather to ulceration than abscess.

If there be no specific cause, after removal of any dead teeth, &c., the gums require the aid of astringent and somewhat stimulating lotions, such as port wine and water, weak brandy and water, myrrh, infusion of Peruvian bark, &c.

There is a common form of disease which is usually called scurvy or scorbutus of the gums. This designation, however, is very improper; for scurvy is a constitutional affection, depending upon long privation of fresh and acescent food, aided

by the influence of cold, dampness, &c. It is a disease peculiar to ships and prisons, and the affection of the gums which attends it, is but one among many symptoms of the disorder. It is well, therefore, to abandon this term, scurvy, as applied to the local disease of the gums in question, and, following the example of Professor Harris, I will consider it as an idiopathic inflammation of the gums, attended by sponginess of structure, recession of their margins, and frequently, destruction of the alveolar processes.

When affected by this disease, the gums present a swollen appearance. Their colour is dark-red or purple; they feel elastic under the finger, and when pressed, pus oozes out between the teeth and the margins of the gums, which are thickened and detached. The proper tissue of the gums, having become to a certain extent fungus, bleeds upon the slightest touch, and is very sensitive.

The disease progresses with more or less rapidity, according to the constitutional health of the patient, and the capability of resistance natural to the organs attacked. Sometimes it is confined to a small portion of the gum, at others, it involves the periosteum of the fangs and the alveoli, and presents a mass of complicated disorder and devastation. A deposition of bony matter sometimes takes place in the bottom of the sockets and the teeth are loosened and drop out.

The treatment of this disease does not differ from that of the ordinary inflammatory conditions previously described. Indeed it is not specifically different.

All irritating bodies, such as decayed teeth and roots, must be removed; irregularities of denture corrected; tartar also taken away; the gums depleted; and after active inflammation has subsided, astringent lotions may be used by way of correcting the habitual looseness of texture.*

* For a more extended description of this disease and its treatment, than is compatible with the scope of this work, see Dr. Harris's Dental Surgery, a work which I will take for granted is in the hands of every scientific dentist, and every student of dentistry.

CHAPTER IX.

CARIES—MORTIFICATION.*

THE term caries has different meanings when applied to the bones at large and to the teeth. Let us first consider the disease of the bones thus called.

Caries in the bones is analogous to ulceration of the soft parts, and is very different from *necrosis* or mortification of these parts.

The bones are vital organs, supplied with arteries, nerves, veins, absorbents, and cellular tissue. Like soft parts, they grow and waste, undergo disease and accomplish reparation.

The denser the texture of a bone the less liable it is to be attacked by caries, and for this reason the bones of children are more susceptible of it than those of adults.

In caries, the bone undergoes a change by which its texture is softened and broken down; fungous flesh, which bleeds very readily, grows up in the interstices formed upon the surface of the diseased bone; fetid, dark-coloured sanies finds its way to the surface through a sinuous channel, and a communication is thus formed between the diseased bone and the external parts.

Caries may nevertheless progress for a long time without the formation of an ulcer and discharge of matter; and these results depend more often on necrosis than on caries.

The treatment of caries consists in the removal of the diseased part by surgical means, and, as is often necessary, the application of the actual cautery upon the new surface. The latter means is not absolutely indispensable; the former probably is, unless, as sometimes happens, the separation of the

* *Kσιπειν*, to abrade.

unsound parts may be accomplished by the unaided efforts of nature.

Caries of the teeth, is a chemical erosion of those organs by the action of the fluids of the mouth, and the accidental matters dissolved in them, upon the salts of which the tooth is mainly composed.

It is yet a mooted question whether the teeth are ever subject to true caries, such as affects other bony structures. I have already remarked that this disease is not apt to occur in the denser osseous structures, and the close texture of the teeth renders them particularly unlikely to be thus affected. Yet it might be too much to say that they are never subject to the active disorganizing process in question. It is certain, however, that caries of the teeth, as commonly met with, is a mere chemical erosion, resulting from the action of acids upon the earthy salts which principally compose them. A human tooth, inserted as a substitute in another mouth, will undergo this change as readily as a natural tooth; showing that in this form of destruction the organs assailed are passive.

MORTIFICATION OR GANGRENE.

These two words are commonly used synonymously to express absolute death of a part, but by some writers the term gangrene is restricted to that condition which immediately precedes death, and *Sphacelus** applied to the latter condition, while mortification is a general term covering both conditions.

According to this use of the terms, gangrene represents the condition in which there is a sudden diminution of pain, if it has previously existed; a livid discoloration and subsequent yellowish or greenish hue of the part; a detachment of the cuticle with effusion of a turbid fluid beneath it, and a softening and crepitation of the part.

When the part has become cold, insensible, black, motionless, without circulation and life, the condition is called *sphacelus*. The state of bone analogous to this is called necrosis, and the dead part when detached, a *sequestrum*.

* Σφαινω, to destroy.

Mortification may result from any cause which prevents the nutrition of a part. Inflammation may so interrupt the circulation as to cut off the supply of blood, or the state of the patient's digestion may not afford a supply of nutrient fluid sufficient for those parts which are least vascular or most distant from the heart, and certain obscure changes may take place in a part which may cause it to mortify, without the precedence of appreciable disease.

When mortification is consequent upon inflammation, the quantity of fluids in the part causes a humid state of the sphacelus; where death has taken place from deficiency of blood, the mortified parts are dry and shrivelled. These opposite conditions have given occasion to the distinction so generally recognised between moist and dry gangrene. This distinction, however, is not so absolute as to be without exception, yet it is correct to a considerable extent.

Different parts assume different appearances when gangrenous. "Tendons, muscles, nerve and cellular substance, look like dirty shreds of wet tow; the skin sometimes looks as if it had been destroyed by caustic or the cautery." The arches of the mucous membrane are often of a grayish or whitish colour. Quesnay states that in one case he saw, the gangrened parts exhibited a remarkable transparency. The black colour cannot therefore be considered as characteristic of gangrene. It may exist independently of mortification, and the latter may exist independently of the other. The principal characteristics of gangrene are, 1st. Complete disorganization of the gangrenous parts, in which the elementary tissue can no longer be distinguished. 2d. Softness and flaccidity. 3d. The fetid and characteristic odour which it exhales. 4th. The sanies, ichor, and fetid gas which escape from it. In that variety of gangrene termed *dry*, the part presents a black colour, a hardness sometimes like that of wood, and always a complete disorganization of the tissue.

The treatment of gangrenous parts must be directed to the limitation of the mortification, and to the removal of the slough. When a part has become dead, it seems to act as a depressing

or devitalizing agent upon the surrounding parts, and even upon the general system. If the gangrene take place in one of the viscera, the patient generally sinks rapidly and soon expires. Immediately upon the gangrenous change, the pulse becomes soft, weak, and frequent, the skin cold, and the nervous system seems to labour under a silent, but deadly influence, not to be resisted.

It is difficult to account for this sudden and extraordinary result. It is generally supposed that the fluids of the gangrenous part, being absorbed, prove poisonous to life; but if this were the case, similar effects would result from the much more extensive mortifications which frequently occur in the skin, muscles, and bones, without those serious constitutional results. The effect must rather be attributed to the powerful sympathy which exists between the viscera and the nerves of organic life.

Where nature makes an effort to check the spread of gangrene, which, except in the instances referred to, she almost always does, a red line of inflammation is first drawn around the affected part. Ulceration soon takes place along this line, and a suppurating furrow separates the dead from the living parts. A similar process goes on beneath, and advancing granulations gradually push off the gangrenous slough, and supply its place with sound flesh. Inflammation and ulceration, therefore, are the means employed for the removal of dead parts, and for limiting the progress of devastation.

In order to effect this, it is necessary that the vitality of the adjoining parts be sufficient to produce healthy inflammation, support the suppuration, and sustain vigorous granulations. It is also necessary, that the inflammation in the adjoining parts be not so great as seriously to impede the circulation in them.

The surgeon takes his suggestion of remedial treatment from these necessary conditions. If the parts adjacent to the gangrene be cold and livid, and if they show no disposition to throw out the inflammatory cordon sanitaire, he sees the necessity of stimulating applications to rouse the torpid energies of the threatened parts. Cantharides, turpentine, or other remedies of this powerful class, will then be put in requisition; and

should the parts under the slough be equally torpid, he will cut through the mortified covering, and apply his excitants to the flesh beneath.

Sometimes, though not often, he will find it better to anticipate the slow process of nature, and at once remove the gangrene by his knife. The latter process is fraught with this difficulty,—that when the surrounding parts are feeble and disposed to gangrene, the use of the knife imparts to them no strength, while it necessarily inflicts injury. The result often is the appearance of the disease in the remaining parts.

When the surrounding parts manifest more excitement than is compatible with their security, depleting and sedative treatment must be instituted. As a general rule, however, this will rarely be required, for the vicinity of gangrene is generally abundantly sedative to the surrounding parts.

Necrosis, or mortification of bone, may take place from similar causes to those which produce gangrene of the soft parts. As the bones possess less vitality, they are less capable of resisting disease, and therefore are more prone to die from injuries and internal causes than other parts. That they are not more frequently necrosed than they are, depends upon their protection from external violence by the soft parts, and the fact, that their limited vitality and simple functions involve less tendency to disease than is connected with the more exquisite organization and complicated functions of other organs.

Necrosed bone is thrown off by a process very analogous to that which is instituted for the separation of sphacelus. Where the mortification is superficial, it is removed by exfoliation; when it is deeper, a persevering effort is made by the surrounding bone and soft parts, to detach and expel it in the form of splinters, or even of large masses, called sequestra.

Owing to the density of bone and its deep-seated position, this is generally a very slow process, requiring months and years for its accomplishment, and often failing altogether. For, after long-continued fruitless efforts to get rid of the dead part, nature frequently attempts to supply the deficiency caused by its loss, and forms new bone around it, leaving orifices in this

bony case, through which the matter may find a vent. When this arrangement has been made, the sequestrum cannot be expelled by natural efforts, except in a fluid or very comminuted state. It is, therefore, generally necessary for the surgeon to cut down to the diseased bone and liberate the sequestrum.

Occasionally, however, nature, though unassisted, will accomplish the expulsion of very large sequestra. In one recorded case, a piece of bone seven inches long, was thus expelled; such cases, however, are very rare.

The presence of necrosis, or caries, may be ascertained very satisfactorily after the formation of the external ulcer. Sometimes the canal will be so straight as to permit a probe to reach the diseased part, and when this is not the case, the presence of an obstinate ulcer, evacuating dark-coloured and fetid sanies, will generally be sufficient evidence of diseased bone.

It is rarely possible to distinguish necrosis from caries, until the sequestrum has become so fully detached as to be movable. The cure of necrosis, as of caries, if procurable by art, depends upon the removal of the part so diseased. In necrosis, the parts surrounding the sequestrum are generally in such a state as to return to health after its removal. In caries, the surface of the parts exposed by the operation, often require the application of the cautery, as before stated.

We have already mentioned, that what is called caries of the teeth, differs very essentially from the disease of the bones which bears the same name.

Caries of the bones, as we have seen, is a diseased vital action, in which the vessels, &c., are active; caries of the teeth is simply a chemical erosion, which may be imitated upon teeth separated from the mouth, and affects dead teeth as readily as living ones.

Caries of the teeth always begins upon their outer surface, and does not appear to be in any manner dependent upon disease, except so far as it may be favoured by an unhealthy structure of the teeth, and a morbid condition of the fluids of the mouth.

In short, caries of the bones is a vital, that of the teeth, a chemical process.

By instituting a comparison between caries of the teeth and that of other bones it will at once be perceived, that there is not the slightest analogy between the disease as it occurs in the one and manifests itself in the other. In the former, it consists simply in a decomposition of the earthy basis of the organs, whereas in the latter, it is analogous to ulceration in soft parts, and constantly discharges a fetid sanies, and frequently throws out granulations of fungous flesh. These are phenomena which dental caries never exhibits, and they establish a wide difference between it and the disease as occurring in other osseous structures of the body.”*

The treatment of caries belongs to Surgical Dentistry; and to works on that subject, and particularly to the excellent treatise by Prof. Harris, I refer the reader.

Necrosis may take place in the teeth as in other bones, and from a similar cause,—the cessation of circulation in them.

This may be effected by violence. The teeth, especially the anterior ones, are very much exposed to be injured by blows or falls, and it sometimes happens, that a shock thus inflicted is sufficient to break up the vascular connexions of the organ without displacing it from its socket.

More commonly here, as in other bones, the necrosis takes place as a result of inflammation; the pulp having been destroyed by this process.

When a portion of bone dies, the surrounding bone sets up a process of removal and reparation. Nothing of this kind occurs in the teeth; partly because the evil is generally shed over the whole organ at once, and partly because its low vitality does not permit of such efforts.

After necrosis has taken place, the tooth having become a foreign body produces the usual effect of such causes upon the surrounding soft parts. The gums inflame, ulcerate, and de-

* Harris's Dental Surgery, which see, for a thorough examination and exposition of this subject.

tach themselves from the tooth; but not being assisted by similar processes in the bone, they are unable to remove the evil. Chronic disease is, therefore, commonly the consequence.

Necrosed teeth lose their colour, and become dark-brown, bluish, or dingy; sometimes when presenting this appearance, their vitality is not completely destroyed, and therefore, they may remain in the mouth for years without provoking the disease of the soft parts which would require the removal of the necrosed organs.

CHAPTER X.

ULCERS.

AN ulcer is a running sore ; or, in medical language, a solution of continuity in a soft part, with a secreting surface.

Ulcers present a variety of appearances, depend upon very different causes, and exhibit dissimilar conditions of the parts implicated in them.

A great many attempts have been made to classify ulcers. Some authors have endeavoured to arrange them by their apparent phenomena, others by their pathological conditions, and others by the modes of cure to which they severally yield, while some have seized upon accidental modifying circumstances as a reason for multiplying subdivisions already too numerous.

It is impossible to systematize, in pathological science, so as to provide for all the numberless modifications which may be produced in disease by the causes which influence vital action. We must content ourselves with such an arrangement as will enable us lucidly to express what we know of the subject. Once more I remind my readers, that medical definitions are not philosophically complete and accurate.

An important distinction between ulcers is found in the fact that some of them are the result of local injury or disease, and not in any manner dependent for their existence upon constitutional vice, while with regard to others the reverse is the case, the local sore being only a consequence of constitutional disorder. As the treatment must differ essentially in these different cases, it is very important to be able to distinguish the one class of ulcers from the other.

Yet even this distinction, apparently so obvious and proper, is not without difficulty, for local ulcers sometimes involve the

general health, and are instrumental in setting up diseased constitutional action, in which they themselves participate, and, on the other hand, ulcers primarily induced by constitutional causes, may continue after the vice of the general system has been corrected.

The causes of ulcers are various, but can generally be reduced to the following classes :

1. Predisposing causes. All those conditions of the system, or of any of its parts, which debilitate structures, or so alter their vital action as to impede recuperative processes. Fever, scrofula, syphilis, and scurvy, are examples of this kind.

2. Exciting or immediate or local causes : such as wounds, bruises, abscess, suppuration, gangrene, abrasion of the skin from any cause.

3. From the combination of these causes. A slight scratch or excoriation, that in a sound constitution would heal without any trouble, in a habit tainted with disorders as above mentioned, will frequently produce a very disagreeable and tedious ulcer.*

The prognosis of ulcers, must, of course, depend upon the results of a full consideration of the causes and conditions involved in any particular case. The constitution of the patient, his age and habits, the situation and duration of the sore and its peculiar condition of sensibility, &c., must all have due consideration in forming a prognosis.

It is always proper to attempt the cure of ulcers, except such as are of a malignant character, known to be incurable through any means yet discovered.

After ulcers have become chronic, it is sometimes dangerous to heal them until we shall have provided an artificial drain, by seton or issue. The system having once become habituated to the discharge of ever so small a quantity of matter, often suffers severely with a kind of *plethora* if the discharge be suddenly stopped.

The simplest, most practical, and most rational of all the classifications of ulcers I have seen, is that adopted long since

* Benjamin Bell on Ulcers.

by Mr. Benjamin Bell, and generally superseded by more complicated arrangements, which beget confusion in the mind of the student, and are, after all, not more precise and accurate than the one for which I have professed my preference.

Mr. Benjamin Bell classifies ulcers as follows :

LOCAL AND CONSTITUTIONAL.

- | | |
|-------------------------|-------------------|
| 1. The simple purulent, | 5. The sinuous, |
| 2. The simple vitiated, | 6. The carious, |
| 3. The callous, | 7. The cancerous, |
| 4. The fungous, | 8. The cutaneous. |
| 1. The venereal, | |
| 2. The scorbutic, | |
| 3. The scrofulous. | |

It is not my purpose to describe in detail the appearance, nature, and treatment of each of the kinds of sore above enumerated; but I will confine myself to the consideration of such as may occur in the mouth, and thus fall under the notice and care of the Dental Surgeon.

The simple purulent ulcer is the simplest form of sore. It is always a local affection; it is attended with little pain, and but slight inflammation, and furnishes a healthy pus and firm granulations.

A sore of this description needs little or no aid from art, but it is important that the student should be well acquainted with its appearance, because other ulcers, of a less simple and kindly character, must be brought to this condition before ultimate cure.

The simple purulent ulcer is always produced by some local injury, as wounds, burns, &c., happening to persons of sound general health.

In this kind of sore, the pus is white and thick; the granulations small, firm, florid, and pointed. As soon as they have reached the level of the surrounding parts, those next the edges become smooth, and are covered by a whitish pellicle, or film, which afterwards hardens, advances, and forms the permanent covering of the parts previously ulcerated. The white, smooth margin, lost in the surrounding skin or mucous membrane, is

one of the surest characteristics of this kind of sore, but it is not infallible; other qualities must be duly considered, before a conclusion is formed.

Such ulcers require no treatment except to be kept clean, and protected from any interference with the natural process which is hastening to cure.

A little dry lint will accomplish all that can be done by dressings. A simple purulent ulcer may very readily be converted into an angry and obstinate sore by improper local applications, or the occurrence of general constitutional disorder.

I may remark here that no sores are cured by applications of any kind; nature only can provide the means by which these breaches can be healed. Nothing is more incorrect or dangerous than the idea that certain dressings have a specific or magical virtue, by which they close wounds, and cicatrize ulcers. The surgeon may aid Nature—he cannot supply her place; and his business is, generally, so far as the cure of ulcers is concerned, to aid her in her efforts to bring any particular sore into that condition “which natural means will suffice to relieve.”

Simple vitiated Ulcer.—When, from any of the causes we have mentioned, nature fails to produce such a condition of ulcer as we have described, in any part which has been wounded, or when, from improper dressings, motion, and fatigue of the diseased part, or constitutional causes, the progress towards cure is arrested, the discharge from a sore may present one of the following appearances:

1st. It may be a thin, limpid, sometimes greenish discharge, termed *sanies*.

2d. A somewhat red-coloured, thin, and generally very acrid matter, termed *ichor*.

3d. A more viscid, glutinous kind of matter, called *sordes*.*

While discharging matter of a kind like any of these, an ulcer will not heal. The granulations become dark and waste away; the matter, especially that called ichor, is very acrid, and renders the sore very irritable and painful. It frequently excoriates the surrounding parts over which it flows.

* Benjamin Bell.

These vitiated ulcers are more apt to occur upon tendinous and aponeurotic parts, than in situations abounding with cellular membrane, owing to the frequent motion of these parts, and the continual agitation of the sore. Wherever an ulcer is seated upon a part of this character, absolute rest is necessary to preserve its simple and convalescent character.

The cure of these ulcers depends principally upon removing the cause which has operated to change their character for the worse. If the vitiated condition depends upon constitutional causes, these must be combated by the means found most successful in the practice of general medicine; if any local irritant has caused the evil, it must be removed as speedily as possible; if motion of the part has been indulged, it must be restrained.

The local treatment consists in soothing, emollient applications, as it has been found that all those means which allay the pain in such sores, tend also to alter their condition to that of the simple purulent ulcer.

When the sore is seated in the mouth, but little opportunity is afforded for local applications. The best, perhaps, is warm water, frequently taken into, and held in the mouth; or the vapour of hot water received into it repeatedly and for a considerable time. The dentist should look closely in such cases for causes of irritation in diseased teeth and fangs, and also ascertain whether constitutional causes are interested in the production of the troublesome sore. When the ulcer is small, it would be well under these circumstances to destroy its surface at once, with caustic.

The difficulty of protecting ulcers in the mouth from the contact of its secretions, and the food and drink, and the impracticability of dressing them with applications elsewhere serviceable, should make the dentist extremely cautious lest a careless or awkward movement of an instrument in his hand, should produce a wound and sore extremely painful to the patient, and difficult of cure.

The callous Ulcer.—When ulcers become inactive and stationary, rather than progressive, secreting but little, and that

of bad quality, and being little sensitive, they are called *indolent*; if, in addition, the edges become hard and thickened, they are called *callous*.

Very often these callous ulcers are attended with an enlarged condition of the veins of the part, which is called *varicose*. This condition of the veins is very embarrassing to the surgeon, and sometimes produces fatal hemorrhage.

Callous ulcers are most common upon the extremities, and owing to the mechanical difficulty in the return of blood from these parts, they are, in these situations, most frequently attended with varicose veins.

The callous condition of ulcers is the consequence of neglect and bad management. Their cure consists in restoring them as soon as possible to the condition of a simple purulent sore. This can only be done by removing the indurated surfaces. The most expeditious way of effecting this, is to pare away the edges and surface of the sore with a scalpel, thus converting the lesion into a wound of the simplest kind; but as few patients will submit to the pain of this procedure, the application of caustic is generally preferred.

By freely touching the surface of the ulcer with nitrate of silver or caustic potassa, a slough is produced, which, coming away after some considerable time, leaves after it a healthy, granulating surface.

Fungous Ulcers.—When granulations are large and pale, grow rapidly and rise above the level of the surrounding parts, bleed freely upon touch or slight pressure, and make no attempt at cicatrization, they are called fungus or proud flesh. Generally they are soft and spongy, but by very long continuance they may acquire considerable hardness. Fungus is not uniformly sensitive: generally it is not at all remarkable in this respect; occasionally, however, it is very sensitive. It is but imperfect granulation, and may arise from any cause which tends to interrupt the convalescence of an ulcer. Long-continued inflammation of cellular structures and caries of the bones are very apt to be attended by fungus. It sometimes occurs in young and vigorous subjects merely as a kind of

exuberant growth, which can hardly be considered as giving an unfavourable appearance to a sore, as it is readily removed by mild escharotics.

Where fungus depends upon a mere defect of action of the vessels of a part, and not upon the presence of any irritating cause vitiating the character of the ulcer, it may be destroyed very readily by sprinkling upon it some burnt alum, or touching it with lunar caustic. Fungus has not sufficient vitality to resist the impression made by agents of this class, and generally the application of the escharotic will excite the surface of the ulcer sufficiently to cause the growth of firmer granulations.

The Sinuous Ulcer.—This name is given to a sore communicating with long and narrow canals, penetrating the cellular membrane and running irregularly under the skin or between the muscles. These sinuses generally have more than one opening through which pus is discharged.

Originally they are the artificial channels through which the contents of abscesses or the fluids produced from carious parts escape from situations deeply seated, or so placed as to be unable to pass off matter in a straight line; but the sides of the canals themselves becoming inflamed and secreting matter, the whole presents the appearance of an irregular ulcer, connected with some primary source of matter, and forming openings wherever the nature of the part causes a determination of matter to the surface.

Should the sinus remain for a long time without cure, its sides and the edges of its orifices become hard, and it is then called a *fistula*.* This term, however, is most frequently applied to artificial canals which connect with some natural passage.

The cause of sinuses is the want of a free passage for matter, which, seeking the most dependent point, readily penetrates the yielding texture of the cellular membrane, and ultimately produces ulceration at a point distant from its source.

* Fistula—a pipe.

The cure of these sinuous ulcers depends upon making a free passage for the matter in a direct line from its source, and then bringing the edges of the canals together and causing them to unite.

If the edges and sides of the ulcer be too hard to undergo the necessary adhesive process, stimulating or caustic applications may be used with advantage. Sometimes it is necessary to lay open these tortuous canals to the primary abscess, a process which at once gives free escape to the matter, and by exposing the sides of the sore to the influence of the air and proper medicinal applications, generally causes a wound which readily heals from the bottom with healthy granulations.

Sinuses situated in the mouth should always be treated in this way, unless they are connected with diseased bones or teeth, or are so situated as to make the free use of the knife dangerous.

Carious Ulcers are those which are connected with caries or necrosis of bony structures. They are often sinuous, but may be seated immediately upon the caries which causes them.

The discharge from carious ulcers differs from good pus. It is thinner and fetid, and at last becomes blackish, and often very acrid and irritating. Mr. Bell thought that the fetor of carious ulcers always afforded a sufficient means of diagnosis.

The surfaces of carious ulcers are usually softer and more flabby than natural; and instead of a florid red, they have rather a dark brown with somewhat of a glassy complexion.

The granulations generally grow rapidly, but are exuberant and fungoid. Should the orifice heal, either by the efforts of nature or the appliances of art, the apparent cure is of short duration, for the pent-up matter soon finds another vent and produces another ulcer. When a probe is pushed down to the bottom of a carious ulcer, it generally encounters a roughness of the surface of the bone, which plainly indicates its eroded condition.

When obstinate sinuses are observed in the gums, discharging fetid matter, and containing fungous granulations, we may always be assured that the cause is to be found in the presence

of some decayed tooth or root, or to caries of the alveolus, jaw, or some other bony structure.

As a carious ulcer is nothing more than an accident attending caries, the treatment of it must always be secondary to that of the disease which produces it. The removal of the carious or necrosed part, and the employment of the means which will best prevent a return of it, are to be regarded as the proper means of curing the carious ulcer. When the caries is seated in the cancellated structure of bone, it can only be thoroughly eradicated by the terrible energy of fire, and the actual cautery must sweep over the diseased surface and rouse it to the exertion of its vitality. When a tooth is the subject of caries, no such frightful treatment is necessary. The tooth being passive in the matter, and being acted on by chemical agents only, all that is required is to remove the caries and interpose between the fluids of the mouth and the parts of the tooth thus exposed a barrier which must be impenetrable to the action of the fluids which caused so much mischief. The only substance by which a cavity in a tooth can be successfully filled is gold, as it only, of all the metals, possesses both the physical and chemical qualities necessary to the purpose. If gold cannot be used, tin, though far inferior, is the best substitute. All the mercurial amalgams, are exceeding deleterious, both locally and constitutionally, and ought never to be used as dental fillings.

The Cancerous Ulcer.—Cancer, or Carcinoma. This terrible affection occurs under two forms, called occult and open, or schirrus and ulcerative. The former variety generally, though not always, precedes the latter, and presents itself in the form of a hard, dense tumour, of slow growth, generally seated in a glandular structure, at first, in most cases, nearly insensible and subsequently causing very sharp darting or burning pain or twinges, which radiate from the schirrus as from a centre. As the disease progresses, the skin adheres to the tumour, corrugates or puckers, changes colour, becoming of a livid or leaden hue, then ulcerates and ushers in the second stage of the disease, the open or ulcerating cancer.

The ulcer thus produced is exceedingly painful and irritable.

It discharges a thin, fetid ichor, sometimes very excoriating. Its edges are hard and irregular, reversed and contorted. Its surface is generally irregular, showing depressions or excavations. The sore manifests no tendency to form healthy granulations, but spreads among the surrounding tissues, which successively harden and ulcerate, and become cancerous. The lymphatics propagate the disease to the nearest glands, which are found swollen and indurated, and often ulcerated.

The pain of cancer is a burning or scalding sensation, and generally exhausts and destroys the patient long before the devastation of parts can interfere seriously with the functions of life.

As blood-vessels are destroyed in the progress of the disease, bleeding, more or less profuse, occurs.

Cancer, however, presents various appearances. I have seen it occur without preceding schirrus, present an even smooth surface with little secretion; and many other appearances of this ulcer have been observed, as it has been modified by accidental circumstances.

The characteristics of cancer may be considered to be an irregular phagedenic sore, with hard reversed edges, exceedingly irritable under all common dressings, and causing a burning pain. When such a sore has resisted the treatment which is found to be successful in ordinary irritable ulcers, and especially when it is seated in a glandular part and follows a schirrus, there can be no doubt of its malignant character.

Cancer, in all its stages, is altogether intractable to any treatment which has yet been devised, and all but the most soothing applications are found to accelerate its progress and add to the intolerable acuteness of its pain.

The only mode of cure now attempted is thorough extirpation, and this is confined almost entirely to the latent or schirrous state. The open cancerous sore rarely yields even to surgical remedies. It is even a mooted question whether the removal of schirrous tumours is advantageous. Some surgeons contend that where true schirrus is removed, cancer soon makes its appearance elsewhere, often in a more malignant form and in a worse

location, and that the life of the patient is often shortened by the painful operation endured in hope of cure.

It is not by any means easy to settle this question. Surgeons are in the habit of removing all chronic tumours which are hard and painful, whether they present decidedly carcinomatous symptoms or not. Many of these are probably not cancerous, yet the operations by which they have been removed enter into the statistics of cancerous extirpation.

Where but one possible hope is left, we should be very careful not to extinguish it, and we therefore may recommend the exsection of schirrous tumours. To be successful, however, the operation must be performed before the disease has manifested activity by changing the surrounding parts into its own peculiar texture.

The cause of cancer is also a matter of controversy. It is often excited by a wound, especially a bruise or pinch; but this can only occur where there is a constitutional tendency to the affection. On the other hand, it frequently appears without any exciting cause. Some writers, in view of these facts, contend that cancer is primarily a local affection, having a strong tendency to infect the whole system with its own poison. They, therefore, very rationally conclude that if it be extirpated in its latent state, the patient may be entirely relieved from it. Others believe that carcinoma is a constitutional disease, manifesting itself in local changes of the kind described; that it is, therefore, useless to remove the local effect, and the constitutional cause being beyond our control, they prefer, in the present state of medical science, to refrain from all attempts at cure of the disease.

On each side of the question are presented observations and pathological demonstrations, and authoritative names, and without troubling my readers with a recapitulation of the facts and arguments brought to bear upon this subject, I will content myself with suggesting the practical inference which seems most rational upon the whole; which is, that eradication of schirrus may be attempted with good hope, though not with certainty of success; that the excision of open cancer will be an experiment

very doubtful, yet if the reports of surgeons are to be believed not absolutely hopeless; and finally, that under all circumstances the operator must be prepared for a recurrence of the disease.

Many specifics have been suggested for the cure of cancer, and many nostrums are yet vended for the purpose of curing these sores. All of them are useless, and most of them very hurtful. The medicine commonly resorted to by empirics for the purpose of corroding or "eating out" a cancer, is arsenic; an application which adds terribly to the suffering and violence of the disease, and probably often produces most serious constitutional effects.

I attribute to the improper application of this poison, the sudden death of one young lady, who, having a sore, probably of an ordinary kind, upon her leg, was induced through excessive modesty, to subject it to the treatment of a famous female empiric.

Although arsenic is useful in certain obstinate cutaneous affections, it does not control cancer when given internally. When externally applied to a surface so irritable as that of cancer, it necessarily does great mischief.

Cancer sometimes attacks the tongue. I have seen a case of this kind, which seemed to have been provoked by the abrasion of the organ against fractured teeth. The sides of the tongue presented a jagged edge, which gave out sanious matter. The whole body of the organ was schirrous, and the neighbouring glands manifested a similar condition.

A cause so slight as the retention in the mouth of a broken or eroded tooth, seems, in this case, to have been sufficient to excite this fearful malady, in a part, too, where the greatest possible inconvenience and distress must result from its presence. I have recently seen another instance of this kind, in which, the whole glandular structures about the lower jaw were frightfully involved, in which the first impulse to the disorder was given by a diseased tooth.

The lips, too, are very frequently the seat of cancer, and the dentist should be careful not to wound these very vascular and

sensitive parts by careless or awkward handling of the sharp instruments he wields.

As the several varieties of cutaneous ulcer are not likely to require treatment from the Dental Surgeon, I will not consider them, but refer the curious reader to the several surgical works in which they are accurately described, and their proper treatment pointed out.

ULCERS DEPENDENT UPON CONSTITUTIONAL CAUSE.

Venereal or Syphilitic Ulcers.—Impure sexual intercourse has engendered a poison which is capable of producing local and constitutional disease of a distressing and dangerous character. With the consideration of local or primary syphilis we have nothing to do, but as the secondary or constitutional disorder often develops itself in the structures of the mouth, it is necessary that the well-instructed dentist shall be prepared to detect and treat it, when thus manifested.

Syphilis usually presents itself in the form of ulcers, which are called *chancres*; it also causes cutaneous eruptions, swelling of glands and disease of the periosteum, fascia, and bones.

The ulcers vary considerably. Generally they are remarkable for their hardened base, feeling like cartilage under the skin; the borders are red and sharp, the bottom grayish, and the sores painful and not tending to heal.

In the throat, tonsils, and mouth, the disease generally shows itself at once, without much previous tumefaction, so that the tonsils are not much enlarged; for when the venereal inflammation attacks these parts, it appears to be always upon the surface, and it very soon terminates in an ulcer.

These ulcers of the throat are to be carefully distinguished from all others of the same parts. The disease in the throat is uniformly *ulcerative*; this being the first appearance of disease in that part.*

The syphilitic ulcer always begins *superficially*, and is not

* Hunter on the Venereal Disease.

preceded by observable, or at least, by any notable degree of inflammation. This fact will be sufficient to distinguish these sores from the ordinary open abscess of the suppurating tonsil.

There is also an indolent swelling of the tonsil, accompanied by an exudation of lymph, which at first sight might be mistaken for an ulcer; and indeed such exudations, when they accompany scarlet fever, are often miscalled sloughs. They may be detached from the subjacent membrane, which is found unbroken.

There is another complaint of those parts often mistaken for venereal, which is an ulcerous excoriation running along the surface of the parts, becoming very broad and sometimes foul, having a regular termination, but never going deep into the surface of the parts. Mr. Hunter says that there is no part of the inside of the mouth exempted from this ulcerous excoriation, but it occurs most frequently about the root of the uvula, and spreads forward along the soft palate.

The same writer observes that the true venereal ulcer in the throat is a "fair loss of substance, part being dug out as it were from the body of the tonsil with a determined edge, and is commonly very foul, having thick white matter adhering to it like a slough, which cannot be washed away." These ulcers never heal spontaneously, and generally spread rapidly. When the sores are seated upon the pharynx, they produce great distress in deglutition, cough and puriform expectoration, and rapid sloughing of the soft parts, exposing the bones and destroying them even as far as the vertebra by caries. The palate is frequently destroyed, throwing the nose and mouth into one cavity, preventing distinct speech, and causing great discomfort and distress. The dentist will often be required to supply this serious loss of bone by an artificial substitute.

"At other times, especially in cases of long standing, these sores extend not by sloughing, but by rapid ulceration. The aspect is less formidable, but its progress is scarcely less destructive. This variety is most commonly seen on the soft palate. The surface is foul, but the slough which occupies it is of little depth. The sore is edged by a very narrow fringe of

yellow slough, and beyond this for the extent of a quarter of an inch, there is an inflamed margin of a deep crimson colour; but there is not much general sloughing of the surrounding parts. Yet the sore extends daily with extraordinary rapidity. The substance of the part seems to melt away under the ulceration, and the greater part or the whole of the soft palate, is often destroyed before it can be arrested, though no distinct slough can be seen to separate through the whole of its course.”*

Phagedenic venereal ulcers, like cancerous sores, have thickened edges; a characteristic rather of an unhealthy character and spreading tendency, than of any specific quality of the sore itself.

There are several kinds of venereal affections observed in the bones. The periosteum may be thickened and inflamed. This is a very painful affection, the pain being greater at night; and may be mistaken for rheumatism, when the bone is so deeply seated as to prevent the distinct feeling of the swelling. This periosteal disease generally ends in permanent enlargement of the bony structure from deposition of osseous matter. Sometimes the periosteum suppurates and causes exfoliation of the bone.

Caries of the bone frequently commences in the cancellous structure, and gradually perforates the external plate, and then appears as a soft tumour, which may be seen and felt externally. If this tumour be laid open, a glairy fluid is evacuated; the periosteum is found to be somewhat thickened, and the bone beneath is denuded, and in the centre of the denuded part, is found a small hole which perforates the cortical plate and communicates with the interior of the bone. This affection is very common in the skull, and may be seen in the tibia, jaw, and ulna. In its worst forms, it constitutes the worm-eaten caries.*

In determining whether a sore in the throat or a caries of the bones be syphilitic, it is absolutely necessary that the observer shall obtain all the collateral information which may aid the diagnosis, for it is often impossible to decide positively

* Babington.

from the mere appearance of the ulcer, whether it be venereal or not.

Very often cutaneous eruptions of a syphilitic character attend the venereal sore throat, and the presence of such eruptions would be sufficient to decide a doubtful case.

Unfortunately, however, it is not easy to detect with certainty all forms of syphilitic eruption; yet, when suspicion is aroused by the appearance of the throat, and corroborated by that of the skin, or vice versa, there must be extraordinary reasons for inferring the cause not to be venereal.

Syphilitic eruptions may be tubercular. That is, they may appear in the form of hard lumps, covered by red inflamed skin, and often by dead cuticle. These often ulcerate and leave behind them a peculiar copper-coloured blotch.

Another form of syphilitic eruption, is that of small, red, acuminate pimples, sometimes scattered regularly over the surface, at others arrayed in groups.

Scaly eruptions are also common, and sometimes a pustular affection, attended with a large, hard, conical scab or crust (rupia), is observed. These may all be due to other causes, but when occurring together with a suspicious sore throat, they very much strengthen the probability of venereal origin.

Mr. Hunter says, when syphilis attacks the tongue, it sometimes produces a thickening or hardness in the part; but this is not always the case, for it very often ulcerates, as do the other parts of the mouth.

If the character of the disease be clearly venereal, or if it be probably so, it is important that proper remedies be at once administered; for, when the virus has become so generally diffused as to produce the remote symptoms observed by the Dentist, the life of the patient is in imminent peril.

There has been much controversy as to the means of curing syphilis, one party contending for the use of mercurial preparations, and the other denying the necessity of these medicines.

Without pretending to any claim to decide a question so ably supported on either side, I will briefly remark, that mercury will certainly cure the disease, except in a few uncommon cases,

where it exists in a kind of combination with scrofula; and secondly, that mercury will do this without injury to the patient, and generally with as little inconvenience as can attend the use of less certain remedies. Without hesitation, therefore, I recommend its use; especially in constitutional or secondary syphilis, where no time must be lost, and no risks must be run.

As to the particular preparation of mercury most proper for the purpose, there also is difference of opinion. As a general rule, however, I prefer the proto-chloride, or calomel, to any other preparation. It is more certain than blue pill, and perhaps than any other mercurial medicine, and can be used with more safety than the deuto-chloride (corrosive sublimate). My common practice is to give a grain of calomel, to which is added one-twelfth of a grain of opium, night and morning, until the ulcer disappears, or the gums get sore. It is rarely necessary to produce salivation: a mere tenderness of the mouth will generally indicate the predominance of mercurialization in the system, and be attended by healing of the venereal sores, and disappearing of other symptoms of that disorder.

Corrosive Sublimate, in the dose of a twelfth part of a grain three times a day, will often succeed; and in secondary syphilis, is thought by some to be superior to calomel.

When calomel acts too freely upon the bowels, as it sometimes does, even when administered together with as much opium as it is prudent to give, corrosive sublimate or blue pill may be tried. Should these purge also, resort must be had to inunction; the patient being rubbed with mercurial ointment until his mouth begins to acknowledge the mercurial influence. When scrofula exists in union with syphilis, the iodide of mercury may be used.

When after several successive constitutional impregnations with mercury, the periosteal swellings, and other chronic syphilitic conditions remain, I have found great benefit to ensue upon the use of Iod. Potass.

Scorbutic Ulcers.—Scorbutus is a barbarous half Latin name, given by medical writers to *scurvy*, a constitutional affection

depending upon privation from vegetable food, under circumstances calculated to weaken the energies of the system, and which was long a terrible scourge to seamen, soldiers, and the inmates of prisons. It has frequently been confounded with other affections, a mistake which has led to serious consequences. In the year 1700, the celebrated Boerhaave treated with mercury four hundred soldiers thus affected, and killed them all.

The term scurvy, is applied to sponginess and ulceration of the gums from any cause, but this is an impropriety. *Scorbutus*, or true scurvy, is always a constitutional affection, never occurs when patients have lived upon diet sufficiently vegetable, and in short can only be expected to occur in ships, camps, or prisons. Happily, since its character has become known, it is rarely seen now even in these places.

As it would be of little use to my readers, I will not introduce here a full discussion of this subject, which has ceased to be of much interest, even to the general practitioner; but will content myself with a very few remarks upon it, referring those who may be curious to know more of it to a very interesting article in the Cyclopædia of Practical Medicine, written by Mr. Kerr.

Scurvy is a general disease, characterized by debility, foetor of the breath, sponginess and turgidity of the gums, livid subcutaneous spots, particularly of the roots of the hair, ecchymoses, spontaneous hemorrhages, and frequent contraction of the limbs.

The face becomes bloated, early in the disease, and the lips are of a pale greenish hue. The countenance looks sad; the patient complains of extraordinary lassitude, and becomes breathless after slight exertion. The gums soon become swollen, itch and bleed upon touch; they are deep red, soft and spongy; soon fungous and putrid. Bleeding occurs frequently from the mouth and other parts, and the breath is very offensive. The skin is usually smooth and shining, with a suffusion of black or livid spots. Old wounds or sores break out afresh, and ulcers frequently occur.

These sores secrete a thin fetid sanious fluid; their edges are generally livid and puffed up; a coagulum soon forms, which, with great difficulty, can be wiped away or separated from the subjacent parts. These are soft, spongy, and putrid.* A soft bloody fungus, of considerable size, soon rises from the ulcer. When scurvy approaches its fatal termination, the livid and painful swellings break and assume the fungous appearance characteristic of scorbutic ulcers. The hemorrhage becomes more profuse and general; the increasing dyspnoea is accompanied in some cases with pain under the sternum, but more frequently in one of the sides. In others, however, without any complaint of pain, the respiration becomes suddenly quick and laborious, and death unexpectedly puts a period to the disease.

The prevention and cure of scurvy consist simply in providing a proper vegetable diet, and keeping the patient warm and dry. Where this cannot be done, as is the case at sea, the purpose can be effected by administering lemon juice freely, and making the men as comfortable as possible. Medicine has little to do in the matter, though it may render occasional aid. It is always important to distinguish the symptoms of scurvy from those of other diseases; fortunately there is no longer much danger of mistakes in this respect. The subject does not belong to practical dentistry, though the disease of the gums connected with it makes it proper for me to mention it; my chief purpose in doing so, however, is that my readers may have a proper knowledge of the meaning of a word which is continually misused by dentists by applying it to a local fungous affection.

Scrofulous Ulcer.—*Scrofula.* This word is derived from the Latin word *Scrofa*, a hog—why, it is not easy to perceive; but it is singular that the corresponding Greek word is also derived from a word (*χίρος*) signifying a hog.

Whether those who originally described the disease were aware that swine are subject to it, or whether, as is most pro-

* Cyclop. Prac. Med.

bable, they intended to portray the dirty appearance of those afflicted by it, we have no means of determining. Scrofula is also known as Struma, and the word Strumous is frequently used instead of Scrofulous.

Scrofulous tumours and ulcerations are also vulgarly called King's Evil, from the loyal superstition which for many years attributed to the touch of a sovereign the miraculous power to heal the disease. Multitudes of cases were touched by the monarchs of England, from Edward the Confessor to Queen Anne. A similar practice existed in France. Many got well after this process, as they do after all quackery, except the *severer* kinds. The king's physicians took care of the royal reputation by selecting from the candidates for the manipulation, the best-looking cases.

Scrofula is a constitutional disorder which manifests itself in a great variety of local affections, and is among the most distressing, and in some of its forms, the most fatal of all the ills that flesh is heir to.

The pathology of scrofula is not well understood. It seems to affect particularly the lymphatic system; the glands, especially the subcutaneous and mesenteric, being most frequently the parts which first manifest the local influence of the constitutional vice. Very often, however, its ravages are confined to other organs. The lungs are especially liable to be affected by it, assuming that well known and so far incurable diseased condition, which is called *phthisis** or pulmonary consumption.

Although persons of all temperaments are subject to scrofula, yet those who possess what is called the lymphatic temperament, are much more liable to it than others; and as this system is predominant in children and women, they are more exposed to scrofula than adults and men.

* Phthisis, from *φθωω*—I consume—Consumption. There are several chronic diseases of the lungs, which are vulgarly known as consumption. Most of these are inflammatory affections and their consequences. Phthisis, or consumption proper, is an entirely different disorder in its cause and character. It is, with few exceptions, incurable from the commencement. The inflammatory affections are all curable if promptly and rightly treated.

Yet men are by no means exempt, but those of the male sex in whom the lymphatic temperament predominates, are most liable to it.

It is common to distinguish the scrofulous disposition by certain external marks which doubtless indicate, with considerable accuracy, the presence of the constitutional vice. These appearances, from the strong disposition to phthisis which they manifest, are frequently called "consumptive."

These marks are a fine white skin; light hair; rounded plump figure; delicate complexion, with rosy cheeks; large lips; large lower jaw; yellowish teeth, or teeth, whatever their colour, which are soft and easily attacked by caries; a large head; straight and narrow chest; large abdomen, and soft and flabby flesh. Persons presenting these external appearances are generally amiable, and often very sprightly and intelligent, and among them are found the loveliest and most attractive of the female sex.

The strumous diathesis is exhibited, in another class of persons, very differently. In these the complexion is dark, the skin harsh, and the habit indolent; the countenance is swollen and pasty, and all the functions of the body are sluggish and imperfect; the nervous energy is feeble; the feelings are obtuse, and the moral and intellectual powers occupy a very low rank. Scrofulous cases of this character are not by any means uncommon in Britain or the United States, although far more rare than the other variety, but extreme instances are frequent in some districts of Switzerland and France; and in these, human nature appears reduced almost to the level of the brute creation, assuming forms which awaken feelings of humiliation and disgust.*

Appearances, such as described as characteristic of either of the two classes of scrofulous subjects, are not necessary to the development of scrofula; but when these marks present themselves, nothing but the action of circumstances most favourable to counteract the threatened evil, can prevent its appearance.

* Cumin.

Scrofula is the consequence of damp, cold climates, bad diet, and want of exercise and fresh air. These circumstances, when combined, may engender the disease in any child, but in most cases it is hereditary, being transmitted from the parent; whole families being frequently destroyed by this fatal legacy. In one recorded instance, in which the father and mother were both strumous, eight children out of nine died in childhood, of scrofulous affections.

The scrofulous disease manifests itself in a variety of ways; in glandular swellings, sluggish ulcers, distorted bones, cutaneous eruptions; but the most common and the most characteristic attendant upon scrofula, is the production of a soft, cheesy, unorganized matter, which is found mixed with the pus of abscesses or deposited in rounded masses of different degrees of firmness, and of various sizes, called tuberculous matter. Sometimes this is enclosed in cysts, sometimes diffused throughout a part, and sometimes it is found in the natural canals or cavities of the body. To the depositions of this matter and the irritation and inflammation which it produces, are due the most serious consequences of scrofula.

Scrofulous ulcers are generally consequent upon tumours of the same character. These, after having been indolent for a considerable time, at last ulcerate and discharge their softened contents. Instead of healing, the orifice enlarges, and an ulcer is established, discharging a thin glutinous fluid, occasionally intermixed with the peculiar cheesy or curdy substance already described.

Commonly, scrofulous sores are not painful; occasionally they are so. The skin around them is livid and slowly ulcerates; the granulations are flabby and pale, and their margins are usually overlapped by the thin unhealthy looking skin. The matter often hardens about the sore, and presents a disgusting appearance. The ulcer heals slowly, and the cicatrix is irregular, puckered and wrinkled, "with small portions of projecting skin and even complete bridges, admitting a probe to pass beneath them; features by which their origin, long after a cure, may be readily discovered."

As one ulcer heals, another is often ready to break out, and the patient is gradually debilitated and worn down by the incessant irritation and drain. Sometimes the disease manifests itself in a vital organ, and by speedy death curtails the sufferings of the patient.

To scrofula seems properly to belong a very serious ulceration of the lips, nose, &c., which is called *lupus*, or *nolle me tangere*.

This disease commonly commences by the appearance of a hard, livid tubercle, which, after being indolent for a longer or shorter time, ulcerates, and produces ichorous, wasting, ill-conditioned sores, which, in some instances (*lupus exedens*), rapidly destroy the adjacent parts; in other cases, *lupus* induces a sort of hypertrophy of the skin. Sometimes the first appearance of the disease, is a mere violet red colour, tending rapidly to ulcerate and destroy the surrounding parts.

The tonsils of scrofulous persons are very prone to chronic, indolent swellings, which, upon slight provocation, take on acute inflammation. The glands in the neck, and the sublingual and submaxillary glands, are often affected by scrofula, forming hard, painless, indolent tumours, which sometimes suppurate, causing intractable ulcers, which, after pouring out the glutinous and flocculent matter peculiar to this kind of sores, heal with the irregular, puckered, ugly cicatrix before described.

Dr. Cumin says that scrofula occasionally attacks the tongue. It sometimes assumes the form of aphthous ulcerations, and fissures of the margin, but its most characteristic features are small knots or nodules, superficially imbedded in the substance of the organ, varying in size from that of a small shot to that of a horse bean. They cause no uneasiness, unless when firmly pressed, and then the pain is slight and pricking. The mucous membrane covering them, is red and prominent, and soon breaks in the centre, giving rise to an ulcer, which spreads and destroys by sloughy erosion, with much pain, profuse salivation, furred tongue, and fetid breath. The ulcers, under proper treatment, become clean, contract and heal; but the

hardness remains : fresh nodules form in other parts of the organ, and the same train of suffering is gone through, after a longer or shorter interval, according to the state of the patient's health and the regularity of his mode of life, until a decided improvement be produced on the constitution by time, change of climate, or the employment of remedies.

The mucous membranes of scrofulous persons are apt to inflame, and generally pour out mucus in large quantity, and often of an acrid quality ; not unfrequently the mucous membrane of the mouth presents aphthous exudations, excoriations and small ulcers.

I have already mentioned that the texture of the teeth of scrofulous persons is of that character which makes them an easy prey to caries. When we remember that teeth thus little capable of resistance are continually exposed to the action of unusually abundant and acid mucus, we may readily account for the ravages of caries upon the mouth of persons of scrofulous taint.

Scrofula sometimes attacks the bones of the face, especially the nose, causing, when the disease is confined to a very small portion of the osseous tissue, the intolerably fetid sore called ozena, and when acting upon a large surface, horrible devastation and deformity. The bones of scrofulous subjects are more slender, the outer wall thinner, and the inner softer and more vascular than the bones of others.

Syphilis, however, is the more common cause, both of ozena and osseous destruction, but it is in subjects of scrofulous constitution that it produces its most fearful and irresistible effects.

The cure of scrofula depends much upon hygienic treatment. As experience shows that cold, humid climates are most favourable to it, one of the best means for preventing and curing its disorders, is evidently removal to a warm, dry climate. Besides this, which is often impracticable, exercise in the open air, generous diet, and the use of such medicinal remedies as are calculated to invigorate the frame, are the best means by which to combat this obstinate and most serious affection.

Iodine is the best medicine we possess for removing the superficial glandular obstructions, and healing the ulcers of scrofula. It often exerts a sanitary influence upon these and similar external manifestations of scrofula. Unfortunately the high hopes entertained at one time of the power of this medicine to cure the radical constitutional evil, or even the most fatal form of its development, tubercular phthisis, have been totally disappointed. This terrible form of scrofulous malady yields little to therapeutic agents, and, for the most part, is checked only by the hygienic means before referred to. Cod-liver oil is now much used in scrofulous, and especially phthisical cases, and seems to benefit them, either through some unknown medicinal principle, or, as is more probable, through the concentrated and highly nutritious aliment it affords to the wasting tissues.

CHAPTER XI.

TUMOURS.

THE term tumour,* literally means a swelling, and is often used in this wide sense, but it is more properly restricted to such enlargements as depend upon morbid growth, either of the natural parts, or of organizations not natural, formed in the tissues of the body. This definition rejects such swellings as are produced by the presence of free fluids and gases.

Tumours may be divided into malignant, and those which being comparatively innoxious, may, for want of a better term, be called benign.

The malignant tumours are such as depend upon some constitutional vice, and, resisting all remedies, tend to convert the surrounding tissues into their own substance. These spread rapidly, ulcerate, destroy the blood-vessels of the part, produce frequent and exhausting hemorrhages, are sometimes very painful, and if permitted to remain, ultimately fatal.

Cancer, or carcinoma, and fungus hæmatodes, or bleeding fungus, are the general names for these tumours, though distinct names have been given to varieties of each of these disorders.

FUNGUS HÆMATODES, BLEEDING FUNGUS, SPONGOID INFLAMMATION, SOFT CANCER, MEDULLARY SARCOMA.

This disease is almost uniformly, perhaps always, a constitutional one, and therefore beyond the reach of any local means. Unfortunately we have no antidote to the poison shed throughout the whole body, and, therefore, there is no disease more intractable and hopeless.

* Tumeo, I swell.

It generally makes its appearance in the form of a small elastic tumour; at first painless, but subsequently very painful. As it grows, its elasticity becomes more remarkable, a peculiarity which has originated the term spongoid inflammation. When ulceration takes place, fungus shoots forward, and the bleeding which results from these irritable and morbid granulations, has occasioned the name of the disease.

Patients who suffer from fungus hæmatodes, have frequently a peculiar appearance which indicates their constitutional pravity. Their skin is sallow, or has a greenish cast, they are often bedewed with clammy perspiration, and are troubled with cough and dyspnœa.

Should the tumour be extirpated, the disease soon appears in some vital organ and proves fatal.

When the tumour is examined after death, it is found full of a grayish greasy substance, somewhat like that of the brain, mixed with a thin bloody matter.

Polypus.*—This is the name given to a variety of tumours which have their seat in certain cavities, particularly the nose and uterus, and by their growth distend and break up the surrounding parts, and otherwise mechanically impede the performance of function, even to a fatal extent.

Some surgeons distinguish polypi as benign and malignant. Others deny that any such essential distinction exists. Probably the disease is never malignant in the proper sense of that term, unless the constitutional tendency of the patient to some of the forms of carcinoma engrafts the latter disease upon the polypoid tumour, in which case it may present the appearance of cancer or fungus hæmatodes.

As a general thing, polypus, however dangerous, has no malignancy about it. The harm it does is due merely to its bulk and unfortunate position.

Polypus is very often seated in the nose. According to Mr. John Bell, every polypus, here seated, is in its early stage a small movable tumour, attended with sneezing and watering

* Polypus—πολύς, many—πους, a foot—from a supposed resemblance to the radiated animal so called.

of the eyes; swelling in moist weather; descending with the breath, but easily pressed back with the finger. It causes no pain, and generally begets no alarm; yet this small, innocent looking tumour may become most distressing and fatal. As it increases, the pressure it exercises upon the delicate structure of the cells, &c., where it is seated, begins to cause serious suffering. It fills the nostrils and obstructs the breathing. The eyes become watery from the pressure upon the lachrymal sac; the hearing impaired by the obstruction of the eustachian tube, and the voice changed by the stoppage of the nostril. The swallowing begins to be impeded by the depression of the palate; the bones become carious from the steady and increasing pressure; the tumour projects from the nostril before and over the arch of the palate behind; the nose is twisted; the countenance distorted; the patient suffers with terrible headaches—a foul and fetid matter is discharged from the nostrils; alarming hemorrhages ensue; the floor of the antrum begins to give way; the teeth fall out and matter issues through their sockets; the still increasing pressure constantly aggravates the sufferings of the patient until death closes the scene.

Though all polypi, from their tendency to grow, may in time produce the terrible train of symptoms above enumerated, yet I cannot agree with Mr. Bell, that all are essentially similar. They differ very much in colour, density, and tendency to return. Some are pale and so loose in texture as to be almost vesicular; others are red, hard and resisting, &c. But in all cases they must be removed, and it is of little use to distinguish between them.

There are four ways of extirpating nasal polypi: extracting them with forceps; tying them with ligatures; cutting them out, and destroying them with caustic. The manner of performing these several operations is described in the books on general surgery. It is not within my province to recapitulate them.

Benign Tumours.—Are those which have no tendency to spread by converting adjacent tissues into their own substance; which do not depend upon constitutional vice, and may be con-

sidered as mere local aberrations from healthy growth. Of these there are several kinds, which may be reduced to two classes, the Sarcomatous* and Encysted Tumours, and Exostoses.

Sarcomatous or fleshy tumours are known by their firmness, redness, and fleshy feeling. (Some of the malignant tumours are arranged by Mr. Abernethy under this class.) There are several varieties of them, of which the common Vascular and the Adipose or fatty are, by far, the most common.

These tumours grow to great size; are not painful, and may be handled with impunity. Their size and situation, however, often make it necessary to remove them. If permitted to pursue their natural course, they sometimes suppurate, and then subside. This mode of cure, however, involves so much inconvenience, that it is commonly better to extirpate them.

Encysted Tumours, or as they are commonly called, *Wens*, have this peculiarity, that their contents are contained in a cyst or sac, or bag. The contents of the cyst are various. Sometimes the contained matter is fatty, in which case the tumour is called a *Steatoma*.† Sometimes it is a yellowish, thick substance, somewhat like honey or a mixture of honey and wax. Tumours of this kind are called *Melliceris*.‡ When the contents are like fluid cheese or pap, the tumour is called *Atheroma*.§

The contents of these tumours, however, are not always of such a quality as will permit them to be classed under the names above mentioned. It is not necessary, however, to be more precise. Perhaps, for all practical purposes, it had been as well to have permitted them all to wear the popular designation, *Wens*.

These encysted tumours are common about the head, and frequent upon the eyelids. They are generally globular, not sensitive, and cause no inconvenience beyond what is inseparable from their weight and size; and the trouble from these causes will, of course, depend upon their location. They usually grow slowly, but sometimes attain great size. Some-

* Σαρκῆς—flesh.

† Μελι, honey, and Κηρός, wax.

† Στεῖγας—fat.

‡ Αθήγας—pap or pulp.

times the skin above them ulcerates, and the tumour is thus evacuated. This does not very frequently occur. These tumours should always be removed by dissecting them out, being careful not to leave any portion of the cyst behind—for if this caution be neglected, the disease is liable to return, and does not always present, upon its second appearance, the benign character which characterized it originally. For obvious reasons, the operation should always be performed when the tumour is small.

The mode usually adopted in the extirpation of these tumours is to dissect out the sac with the contents entire. Owing to the yielding nature of the contents, this is a tedious and troublesome process. Sir Astley Cooper recommended to cut through the sac at once, and then to dissect it out; and doubtless this is the more easy method, inasmuch as the divided edges of the cyst may then be held by the forceps. Encysted tumours occurring in the mouth should be attended to as soon as they are perceived.

*Bony Tumours—Exostosis.**—An enlargement of the bone by the addition of osseous matter within its cavity or upon the surface. There are several varieties, denominated ivory, lamellated, &c., according to the density of the tumour and the disposition of its particles.

The bones are liable to other forms of tumefaction, which differ from exostosis, although often confounded with it. When the bones are enlarged by mere distension or separation of their parts, the disease is not at all similar to the dense tumour produced by the presence of an unnatural quantity of bony substance.

Thickening of the periosteum sometimes occasions an apparent enlargement of the bone, when in fact the osseous matter is not at all increased or distended.

Sir Astley Cooper described exostosis as having two different seats, viz.: between the external surface of the bone and the periosteum, constituting *periosteal* exostosis; and in the medullary membrane and cancellated structure, forming *medul-*

* Εξ, out of στήν—a bone.

lary exostosis. Sometimes he found the production of bone preceded by cartilage, in which it was deposited; at other times connected with a fungus of a malignant character, containing spicula. This latter form of disease seems to have been a variety of osteo-sarcoma.

Exostosis may occur upon any of the bones, and the cause of the disease is generally inscrutable; depending upon irregularity of ultimate nutrition, a process which cannot be comprehended.

The structure and consistence of exostosis present great differences. Sometimes, especially when the tumour is not very large, and when situated on the surface of a cylindrical bone, one may trace with the eye the diverging of the osseous fibres, in the interspaces, of which we might say that there is deposited a new bony substance, the organization of which is less distinct. Sometimes the tumour is entirely cellular, and formed of a few broad, laminal, intercepting, extensive spaces, which are filled with matter, different from the medulla, and of various quality. This case is denominated the *laminated* exostosis. Sometimes the enlarged portion of bone makes a sort of hollow sphere, with thick, hard walls, the cavity of which is filled with fungous granulations, more or less extensive and indolent. According to Boyer, this variety of the disease differs essentially from osteo-sarcoma, notwithstanding external appearances. The case here alluded to, Mr. S. Cooper considers the same as that which Sir Astley has named cartilaginous exostosis of the medullary membrane.*

In this last-described form of exostosis, Sir Astley Cooper says that the original shell is absorbed and a new one deposited, and within the ossified cavity thus produced, a very large mass of elastic, firm, and fibrous cartilage is formed. This form of disease is not malignant, but often ends in very extensive disease.

A true exostosis, consisting of dense bony matter, and of moderate size, may exist without much inconvenience to the surrounding parts, provided they be of a kind to endure the

* Cooper, Surg. Dict.

degree of pressure without distress. But where the exostosis is so situated that its bulk can only be accommodated by pressing upon dense and unyielding structures, or upon nerves or blood-vessels, or where the enlargement impedes muscular motion, these tumours may occasion very serious consequences. The action of the flexor muscles of the leg has been seriously interfered with by an exostosis in the neighbourhood of the knee. An exostosis of the orbit has displaced the eye. Sir Astley Cooper narrates a case of this kind, where two exostoses, growing from the antra, pushed out both eyes, and finally produced death by pressure upon the brain. In another instance an exostosis of the sixth or seventh cervical vertebra, stopped the circulation in the radial artery by pressing upon the subclavian, and in another a cartilaginous exostosis of the medullary membrane of the lower jaw extended so far back, that it pressed the epiglottis down upon the rima glottidis, and destroyed the patient.*

The causes of exostosis are various, and, for the most part, little understood. The venereal disease is frequently attended with the formation of bony enlargements, or nodes, but this cannot by any means be considered the ordinary, or indeed a frequent cause of other forms of exostosis.

In some individuals there is an unusual tendency to the irregular deposit of bony matter, and provocations, otherwise trivial, will often determine local osseous enlargements. Sometimes these provocations are perceived, as when they consist in some form of external force, as blows, pressure, &c.; more frequently the determining cause is as obscure as the constitutional vice.

Exostosis is always very hard, sometimes painful, often insensible. The firm resistance of the tumour, and its adhesion to a bone, will generally enable us to distinguish it from other tumours.

Exostosis is commonly gradual and slow in its growth, but the fungous, or medullary swelling of the bones, is often rapid in its development. The latter form of disease is attended

* Surgical Essays.

with very severe pain, and often with much constitutional irritation.

EXOSTOSIS OF THE TEETH.

The fangs of the teeth are more frequently the seat of exostosis than any other part of the osseous structures. This affection often causes great suffering to the patient, and the dentist finds in it one of the most common and troublesome impediments to safe and easy extraction of the teeth.

The disease is always developed upon the root; generally at the extremity, sometimes at the sides; frequently the whole fang is involved, though not so equally as to present a symmetrical enlargement.

Mr. Thomas Bell says that the substance thus added, differs from the natural bone, being harder, yellowish, and slightly transparent. As the swelling progresses, the pressure on the alveolus causes the latter to be absorbed, and thus, as the growth is very slow, room is continually made for the enlarged fang. The wasting, however, being propagated to the tooth, soon exposes the cavity to the action of external agents, and toothache leads to extraction. Mr. Bell says that the continued irritation sometimes occasions thickening of the periosteum and suppuration, and the case becomes one of simple alveolar abscess.

Exostosis of the fangs sometimes occasions neuralgic suffering of a very serious grade and long duration, the cause of which is rarely discovered by an ordinary observer. Sometimes the adjacent parts become functionally disturbed, and multiply the points of suffering. Mr. Fox relates the case of a young lady, who had suffered long with this affection of the fangs, which her medical attendants had entirely overlooked. The eyelid of one eye had not been opened for two months, and the secretion of saliva was so abundant from the irritation that it flowed out whenever the mouth was opened.

Professor C. A. Harris has recorded the following case:*

Mr. S., of Baltimore, having suffered from pain in the left superior bicuspid, applied to a dentist in 1843, for the purpose

* Dictionary of Dental Science, article Exostosis.

of having his tooth removed. In the operation the root was fractured, about three-sixteenths of an inch from its extremity, and the upper part left in the socket. The pain continued, and at the expiration of twelve months the gum over the upper part of the alveolus became very much swollen, puffing out the upper lip to half the size of a hen's egg. The tumour was opened, and a large quantity of dark-coloured, very fetid matter was discharged, which for a short time afforded considerable relief. The tumour, however, soon re-appeared, and was opened four or five times in as many months.

In the fall of 1845, he called on Dr. Harris for advice. The gum was swollen, and the lip and cheek protruded in the manner above described. The tumour was opened again, and about three tablespoonfuls of black matter, resembling thin tar, were evacuated. Upon farther examination, the outer wall of the antrum, immediately over the upper part of the alveolus of the bicuspid, which had been fractured, was destroyed, leaving an opening large enough to admit the end of the forefinger. Believing that the extremity of the root left in the socket was the cause of the mischief, Dr. Harris cut away the outer wall of the alveolus, and removed the fragment. The root of the tooth was found exostosed. The patient recovered completely in a few weeks.

A great number of cases, illustrating the variety and extent of mischief occasionally resulting from exostosis of the teeth, are recorded by writers upon the subject. The dentist when consulted for the relief of pain in the teeth or jaws, especially if of long continuance and obstinate persistence, should always seek carefully for evidence of bony enlargement of the fang. It is a very common disease, and in some individuals affects many, or even all their teeth simultaneously. Sometimes exostosis unites several teeth together. In a specimen presented to the Baltimore College of Dental Surgery, by Dr. G. R. Hawes, of New York, the three superior molar teeth of one side, are thus united. In another specimen, presented by Dr. Blandin, of Columbia, S. C., two upper molars are united; and in a third, presented by Dr. Ware, of Wilmington, N. C., there is a deposition of bone on the roots of a first superior mo-

laris, as large as a hickory nut. Similar specimens are in the museum of the Institution.

The disease admits of no cure, and the exostosed tooth must be extracted. In performing the operation, caution is necessary lest in the effort to tear away the enlarged bulb, the alveolus, or adjoining teeth, or a fragment of the maxillary, be brought with it. It is often necessary to cut away the socket in order to liberate the root.

OSTEO-SARCOMA.

By osteo-sarcoma, is meant a malignant disease of a bone, in which there takes place within it a growth of fleshy matter, which distends the bony walls, and gradually converts the structure into a medullary, cartilaginous, or cancerous-looking substance.

Osteo-sarcoma announces itself by severe, deep-seated pain, which is often felt for a considerable time before any swelling of the bone is perceived. Sometimes the pain is so great and unmitigated as seriously to impair the patient's health, before there is any perceptible disease.

The tumour is at first deep-seated, general over the part, hard and tuberculated. It does not yield to pressure, nor is the pain aggravated by it. The soft parts, for a considerable time, may manifest no diseased condition; indeed, it is not necessary to a fatal result that they should be implicated. Sometimes, however, as the swelling advances and the pain increases, the skin inflames and ulcerates, and assumes a cancerous appearance.

As the disease progresses, hectic fever is set up, and the patient soon succumbs under accumulated suffering. When the sarcomatous bone is examined after such a termination, it is found transformed into a yellowish, cheesy or lardaceous substance, and all the surrounding parts which have participated in the disease, are found to be changed into the same homogeneous matter.

The prognosis of osteo-sarcoma is decidedly unfavourable. No medical treatment is of avail in checking it. Extirpation is the only means which promises relief.

Spina Ventosa is a swelling of the bones with diminution of their density. It is most common in the lower jaw, and in the metatarsal and metacarpal bones and phalanges of the fingers and toes.

These tumours are the result of inflammation or of scrofulous degeneration in the cancellated structure of the bones, producing matter, generally fluid, purulent, and mixed with the dark-coloured matter of osseous disorganizations. Sometimes, according to Dr. Gibson, the contents are cheesy, and Mr. Liston says, curdy. It is questionable whether these scrofulous swellings of the bones are reducible to the same pathological denomination as the fluid tumours properly known as *spina ventosa*. They are not malignant, but for the most part require to be removed by an operation.

ANEURISMAL * TUMOURS.

A tumour caused by the distension of the walls of an artery, or of the heart, is called a true aneurism; if the swelling be due to the rupture of an artery and the extravasation of blood in the surrounding tissue, it is called a *false* aneurism. If an artery be wounded through a vein, so as to permit the arterial blood to pass into the vein, the condition is called varicose aneurism.

An aneurismal tumour may generally be detected by the throbbing or pulsating sensation which it communicates to the hand upon pressure. Sometimes, however, when an abscess happens to be seated over an artery, the pulsation of the latter will be communicated to the former. The pulse often indicates the existence of an aneurism of the heart, or some large artery, by a peculiar thrilling sensation, which has been aptly compared to the feeling of a "shattered quill." As fatal accidents have occurred from thoughtlessly opening tumours of this description, it is always important to examine every tumour carefully before thrusting a lancet into it.

The pathology and treatment of aneurism does not come properly within the scope of the present work.

* *Aneurysm*, to dilate.

CHAPTER XII.

DISEASES OF THE TEETH AND FACE DEPENDENT UPON MORBID CONDITIONS, EITHER GENERAL OR OF OTHER PARTS.

Neuralgia.*—Certain nerves are the organs of sensation, and like other parts of the body they are liable to disease. When such is the case, unless the affection be of a kind to lessen their sensibility, they become the seat of very severe suffering, which is called neuralgia.

It may be asked whether all painful sensations are not seated in the nerves? I answer that they are; yet the distinction between neuralgic and other pains, is that in the case of the former the nerves are concerned primarily rather than as instruments; or in other words, they transmit intelligence of their own suffering (for such is pain), not that which is only shared by them with adjacent parts. We must not expect philosophical definitions in medicine. The term neuralgia is not precise, but it is sufficient for practical distinction.

The superficial nerves being by far the most sensitive, and withal the most exposed to injury, are very much more frequently affected with neuralgia than those which are deeply seated. It is not certain whether the seat of the disease is in the neurilemma or the nervous pulp. In fact the ultimate nature of the nerves is too little known to permit us to hazard an opinion upon this subject.

Neuralgia is a very acute pain, which generally commences suddenly, and occupies a single spot, from which as the attack progresses in violence, it radiates by pangs or flashes to the surrounding nerves. The pain is generally sharp and darting

* *Nευρον*, a nerve, and *αλγος*, pain.

or burning, and may be distinguished, among other characteristics, by this, that in its radiations it follows the threads of the nerves without extending to the adjacent structures. There is no heat, redness, or swelling, the absence of which is sufficient to distinguish the disease from inflammation. The pain after continuing for a longer or shorter time, rarely longer than a few hours, abates, generally suddenly, and disappears, to return with equal rapidity if the proper provocation be repeated.

The proximate cause of neuralgia is unknown, as indeed is its pathology.

There are two varieties of it, which may be termed pure and intermittent.

By pure neuralgia we mean that variety which is not, so far as we know, connected with or dependent upon any other affection, general or local.

This disease generally occurs in pale, thin, and feeble persons, and seems to be a disease of debility. The pain for the most part comes on suddenly, and gradually increases to great intensity, when either through the efficacy of remedies, or in obedience to unknown laws, which regulate the ebb and flow of nervous influence, it abates rapidly and leaves the patient entirely free from suffering. It does not return until some provocation be applied, when it will suddenly reappear, and will not be appeased for several hours. Nor is it necessary that any powerful irritant be applied in order to rouse the nerve to renewed agony. Often the slightest cause will be sufficient; the gentle movement or touch of the part, and especially the slightest breath of cool air, will often be sufficient to renew the terrible pain.

The intermittent neuralgia is a symptom, and often the only one, of ague, or intermittent fever, as it is commonly called, but which in this case must drop the latter word, as there is no fever present. Of this disease I must speak at length presently.

Neuralgia of each kind may be located in various nerves. The scope of this work makes it necessary for me to notice but one speciality of the disease.

NEURALGIA FACIEI OR FACIAL NEURALGIA.

To this subject I would particularly invite my readers, as it is one which it is most important for all dentists to understand. The reason will be seen in the sequel.

Neuralgia faciei is sometimes called *tic douloureux*. The word *tic* means a sudden twitching or convulsive movement, and as this is sometimes noticed in the faces of persons suffering with neuralgia of that part, the term *tic douloureux* or painful tic, was given to the affection.

Neuralgia faciei occurs in some of the branches of the fifth pair of nerves, and the first and second branches are more commonly its seat. The pain is therefore more frequently suffered over the orbit, in the cheek, mouth, lower jaw, and lower teeth.

It will be perceived at once that the dentist must often be called upon to discriminate between this disease and ordinary toothache, and that, unless he be properly informed upon these subjects, he may add to the terrible suffering of his too confident patient, the additional anguish of tooth extraction, and the injury of losing sound and most valuable organs.

In most cases the neuralgia of the nerves of the jaw is at first mistaken for toothache, and frequently ignorant dentists have extracted tooth after tooth, and have at last relinquished the patient to his aggravated suffering.

The diagnosis of this malady is not difficult. From all acute inflammatory conditions it may be readily distinguished by the absence of all the other symptoms of inflammation except pain, and by the peculiar character and direction of the pain. The fact that it subsides, disappears, and returns, will also serve to distinguish it from the continued pain of inflammation.

From toothache depending upon exposed nerves, it may be diagnosed by the evident centralizing of the pain in a certain tooth, by the aggravation of it when the tooth in fault is struck, and by the positive evidence of a cavity in it, with an exquisitely sensitive pulp exposed.

The treatment of pure neuralgia faciei is palliative and curative.

The palliative treatment consists in the use of such means as are calculated to allay the pain of the paroxysm. The curative consists in the employment of such remedies as experience has shown to be most useful in restoring the health of the patient. Of palliative means, warmth is one of the most important. Cold aggravates the pain intensely, and will almost always excite a paroxysm of pain in a patient subject to neuralgia. Warm or even hot applications to the face are therefore important aids in allaying the suffering. Counter irritants, such as mustard plasters, blisters, cupping, &c., are also occasionally useful.

But our main reliance for the relief of neuralgic pain, is in the use of narcotics* or anodynes,† and especially of opium, which is vastly superior to all the rest.

It is necessary to give this medicine in full doses, if we would benefit the patient under these circumstances. An adult should take two grains of opium, or sixty drops of laudanum, and in some severe cases, or when the patient has become accustomed to the effects of the drug, this dose will require increase or repetition.

Aconite, another powerful narcotic, which has a remarkable quality of lessening sensibility, is now much used, both externally and internally, for the relief of neuralgic pain. It must be used with great caution, as it is eminently a dangerous article.

The curative treatment of pure neuralgia will be modified by circumstances. If the patient be plethoric, with a red face and active pulse, even general and local bleeding may be premised. Such, however, is rarely the case, and when it is, we have reason to believe that the disease is rather rheumatic than neuralgic.

If the digestion be bad, which is often the case, correctives must be directed to the organs involved. But in most cases the restoration of healthy digestion will not be sufficient to procure permanent relief.

* Narcotics, from *ναρκεω*, I stupify. † Anodyne, from *α*, primitive, *οδυνη*, pain.

Generally, neuralgia is a disease of debility, and is found in the cold, pale, and feeble, and in persons of evidently broken health. In such cases the tonic medicines offer most advantage, and of these none are found to be so useful as the salts of iron.

There are several preparations of this medicine. The carbonate, if properly prepared, is a good form of administering iron, but by far the most valuable preparation is the sulphate. This has also the advantage of being generally good as found in the shops, and of being always readily procured. It is, I think, much more certain and efficient than the other ferruginous preparations.

It may be given in doses of a grain two or three times a day, and must be continued for several weeks. Under its use the patient will generally improve in strength and colour, and with the invigoration of the general system, the neuralgic affection will frequently disappear. If this medicine should disagree with the patient, or it should fail after a fair trial, recourse may be had to other medicines of the tonic class, of which there are many, mineral and vegetable.

It is a very common thing for authors and practitioners to confound the pure and intermittent neuralgias, through want of discriminating periodicity, from a tendency to return upon slight provocation. Yet the distinction is plain and very important, for upon proper diagnosis of the form of the disorder depends the rational treatment of it.

In pure neuralgia the nerve after the subsidence of a paroxysm is left in an exceedingly irritable state, so that it will be excited to another by causes of irritation in themselves exceedingly slight. But this return is merely accidental and occasional, and of course, obeys no law of regular occurrence. In some instances the exciting cause may be so trivial as to escape notice, but after long and painful experience, the patient learns to perceive potent agents for evil in things which previously eluded observation altogether.

Periodicity, is the regular return of paroxysms in accordance with a law of the disease and independently of provocation. It generally observes fixed periods of return and depar-

ture, and when irregular as to the common law which governs the type to which it belongs, it obeys some regulation of its own, by which some well-defined proportion of paroxysm to intermission is preserved. It does not follow then, that because the neuralgic pain abates, either of itself or under narcotics, and recurs in a few hours or days, that consequently it is periodical, and must be treated by quinine.

Intermittent Neuralgia.—In order to understand the character and treatment of this disease, it is necessary to have a correct knowledge of a particular class of fevers, which present very curious phenomena.

These fevers belong to the class which we have designated as idiopathic; and to the family of malarious or marsh fevers. They are commonly known as *agues*, from the fact that each paroxysm is preceded by a chill. Hence, also, they are known popularly as chills and fevers.

The cause of these affections is always malaria; no other agent or combination of circumstances produces them, and this is so true that the fact of exposure to malaria is most important in deciding upon the character of the disease in mooted cases.

Malarious neuralgia always assumes the intermittent, never, as far as I know, the remittent type. It may appear as a quotidian, tertian, or quartan, or it may be irregular in its periods. Its paroxysms are rarely preceded by chill, accompanied by fever, or perceptibly finished by a sweating stage. Though evidently depending upon the same cause as intermittent fever, it has no phenomena in common with the former, except its paroxysmal character, periodicity, and curability by certain specific means.

In endeavouring to ascertain the cause of violent intermitting pains in the face, it is all-important to learn whether the patient has previously been exposed to malarious influence. If it shall appear in any instance that he has not been out of the central part of a large city, known to be free, at least in such part of it, from all emanations of a malarious kind, this fact is abundant evidence that the patient has not intermittent neural-

gia, however strong appearances may be to the contrary of this opinion. On the other hand, if he lives in a marshy or malarious country, or if he has visited such a locality during the latter part of the preceding summer or early part of the fall, and especially if the patient has had well-marked ague previously to the facial suffering, then the presumption will be very strong in favour of the malarious origin of the disease.

Besides this historical kind of evidence, the attending circumstances will shed much light on the case. If there be no apparent cause in the condition of the teeth of the affected jaw for so much suffering, if no other disease can be detected in the bones or soft parts, if the pain intermits perfectly and returns periodically, or even if not with entire regularity, yet obviously with some obedience to the law of type, and without provocation, all these circumstances taken together will leave little doubt as to the nature of the malady.

Cure.—This distressing disease, which, if misunderstood, is one of the severest and most difficult to alleviate or endure, is when properly diagnosed a very manageable affection, and often yields to the very first dose of well-directed medicine.

We have previously remarked that the pathological cause of intermittent febrile phenomena is not known; fortunately for the world, experience has not waited for pathology, but has pointed out the means of relief and the mode of applying it.

Certain medicines are known to be positive antidotes to intermittent malarious fevers of all kinds. These agents, if exhibited freely during the intermission, rarely fail to prevent the return of the paroxysm. Owing to the fact that most of these medicines possess tonic or roborant qualities, it has been supposed that they check intermittents, through this quality. Hence, tonics are said to cure ague.

I am convinced, however, that the supposition which attributes the prevention of intermittent paroxysms to the common roborant quality of tonics is a mistake, and a mistake which probably has led to unfortunate consequences in practice.

The medicines which possess in the greatest degree the anti-

dotal power to intermittents, are not those which are the best tonics; while the best of all roborant medicines have but little, if any, power to check intermittent paroxysms.

Cinchona, or Peruvian bark, is by far the best anti-intermittent remedy we have, yet as a pure tonic it certainly is vastly inferior to iron, and hardly equal to some of the vegetable bitters; while arsenic, which, next to cinchona, is the most powerful anti-paroxysmal medicine of which we have any knowledge, has no tonic property at all.

The anti-intermittent quality is therefore obscure, and the medicines under consideration are prescribed for the cure of these diseases, simply because experience has clearly proved their preventing quality, and not because we perceive any rational relation between the physiological effect of the medicine and the pathological condition to be removed.

In the treatment of intermittent neuralgia, we must rely upon the medicines named, or, if these fail, upon others of the same class. Generally, however, if cinchona and arsenic have failed, we must look to some other quarter for an efficient remedy.

The best mode of administering cinchona, is in the form of the sulphate of quinine, because the dose is very much smaller, and sits better upon the stomach, and because, moreover, the cinchona in bulk is uncertain in strength. The best form of administering the quinine, is in solution, although pills of it are often given.

In order to dissolve it perfectly in water, it is necessary to add a few drops of sulphuric acid or *elix. vit.*

The dose varies very much with the circumstances of the case. Thus if the intermission be long, a considerable time is afforded between the paroxysms, for the introduction of the antidote, and small doses, frequently given, are preferable; if, however, but little intermission is afforded, the dose of the medicine must be proportionably greater.

The dose, also, must vary with the urgency of the case, and the condition of the patient. If he has already suffered long, has been much reduced, and has but little power of resistance left, the dose should be very decided.

There is also considerable difference of opinion among practitioners upon this subject. Some prefer giving large single doses, or at least rarely repeated; others, small doses, frequently repeated.

Generally speaking, either mode will effect the desired result; but as it is plain that we should give the least quantity of medicine that will be sufficient, I am in the habit of prescribing moderate doses of quinine, and have never found them to fail except when the stomach refused to bear them; in which cases larger doses would have been yet more objectionable.

The prescription of quinine which I generally give, is a solution of ten grains, dissolved in an ounce of water. A teaspoonful, containing a grain and a quarter of quinine, being given as a dose to an adult.

This quantity is given every two hours, if there be an intermission of considerable duration, or every hour if the time for administering be short.

In very serious cases of intermittent, involving great danger to the patient, and when the powers of life were low, I have very much exceeded the quantity above named. Some practitioners always give it in doses of ten or twenty grains; but this quantity is unnecessary, and hardly safe; for though many patients would bear it without inconvenience, some would suffer from its action upon the brain.

The dose of quinine to young children, must always be very small, as their nervous system is more excitable, and their brain more easily disturbed, than is the case with adults.

Next to quinine, arsenic is our most certain antidote to intermittent affections. It is given in the form of arsenias potassæ, or Fowler's mineral solution, in which form it is manageable, and in proper doses entirely safe. The virulently poisonous character of arsenic, renders it improper to attempt its administration in any but a diluted form.

There are many cases in which the arsenic appears to exercise the anti-intermittent power quite as efficiently as cinchona, and the small bulk of the dose, and the readiness with which its flavour may be covered, make it far preferable for administration to children.

It may be given very advantageously in alternate doses with quinine. After it has been persevered in for a long time, it is apt to produce œdema, which readily subsides when the medicine is withdrawn. The dose of Fowler's solution, to an adult, is eight or ten drops, every one, two, or three hours, or alternating every four hours with quinine. Sometimes it produces nausea and irritation of the bowels. In such cases the dose should be lessened. It not unfrequently produces œdematous swelling of the face and hands, which disappears when the medicine is suspended.

There are many other remedies, which are more or less efficacious in the prevention of intermittent paroxysms, but it is not necessary to mention them here.

The quinine and arsenic should be given only during the intermission; though if this be very short, the administration of remedies, and especially of the arsenic, may be recommenced before the fever has entirely subsided.

In the treatment of intermittent neuralgias, as in other intermittent affections, the prevention of a paroxysm will be more certain, if a full dose of opium be given an hour before the expected return.

In cases of intermittent neuralgia, where the patient has been exposed to malaria for successive years, and has suffered much from the diseases attributed to this cause, the liver and other abdominal viscera are generally deranged, and the neuralgia cannot be permanently relieved until these visceral obstructions are overcome. The purgative preparations of mercury are very useful in such cases.

Of course, no permanent cure can be expected, while the patient shall continue to reside in the unhealthy location, as he must, of necessity, be exposed to continual renewal of the disease. Unfortunately, the advice of medical men is rarely of much avail in directing the choice of residence. This is determined, for the most part, by considerations entirely independent of health; and there is great difficulty in persuading a man that it is unsafe for him to live where it is most profitable or pleasant, and that his own property is situated where nobody ought to dwell.

CHAPTER XIII.

MORBID SECRETIONS OF THE MOUTH.

SIX glands, the parotid, submaxillary, and sublingual of each side, pour their secretions into the cavity of the mouth. The mucous membrane, which lines the organ, also contains upon its surface a great number of crypts, or follicles, which prepare and pour mucus into the mouth. The secretions from the glands and mucous membrane form saliva, which lubricates the facial cavity, and in mastication is thoroughly mixed with the food, the subsequent digestion of which it materially aids.

The mucous membrane of the mouth is continuous with that which lines the pharynx, œsophagus, stomach, and intestines, and sympathizes greatly with any diseased condition which affects those organs. Hence the furred tongue in fever, the red tongue of intestinal irritation, &c.

The fluids of the mouth are readily changed from their normal condition, when the digestive organs are feeble, and perform their functions badly. When such is the case, the secretion of the stomach and its appendages are so changed as to unfit them for the perfect performance of their work; they become, to a certain extent, foreign substances, and are capable of exciting irritation, and also, by mixing with alimentary matters, of converting them into deleterious agents. Generally the change produced upon the fluids of the stomach, &c., under such circumstances, renders them more acid.

Corresponding changes often take place in the fluids of the mouth. They also become acid, and in such cases corrode the dental structures, and cause great devastation of the teeth.

They are also liable to be produced in excess, and to be very abundant in salts, which are collected, mixed with viscid mucus

about the teeth, especially of the lower jaw, forming the several varieties of *tartar*.

The saliva of healthy persons is only sufficient for comfortable lubrication of the mouth, and being passed into the stomach as fast as it forms, it does not collect in the mouth, or require to be frequently excreted. When healthy, it is light, frothy, and but little viscid, without odour, floats upon, and mingles readily with water. In this condition it is slightly alkaline.

The saliva is acid in dyspepsia, and consequently caries is apt to prey upon the teeth of persons suffering with indigestion. Nor may the dentist expect to arrest the devastation, unless he can remove the cause that is continually decomposing the bony structures of the teeth.

That the saliva is acid in certain diseases, is abundantly shown by Mr. Donn , of Paris,—who was so struck with the changes in the chemical character of the fluids of the mouth, as responding to disordered states of the stomach, that he suggested the use of this fact, as the best means of deciding upon doubtful cases of such disorders.

MM. Tiedemann and Gmelin had previously found the saliva to be alkaline in man, and all other animals whose secretions they had examined. Magendie, with his usual carelessness of facts, and boldness of theory, taught that the saliva was sometimes strongly alkaline, sometimes neutral, and sometimes acid: when the stomach is empty, the fluids of the mouth, according to this writer, are acid; during mastication, alkaline; the acidity disappearing sometimes at the presence of the first mouthful. The latter part of this opinion, is of course, mere nonsense.

According to M. Donn , who seems to have investigated this matter with great carefulness, with the hope to find in it some semeiological fact, which might lead to great practical results, the saliva is constantly alkaline when the stomach is in a healthy condition. This, then, he considers the normal or natural quality of the fluids of the mouth, and all deviations from it he considers unhealthy, and indicative of gastric disease.

M. Donné declares that he has never found the saliva acid, when the stomach has performed its functions well.

The only testing means used by this gentleman in his many experiments upon the saliva, were slips of litmus paper. The saliva, if acid, will redden the paper. For test of alkalescence the paper should first be reddened by an acid and then subjected to the action of the saliva.

M. Donné narrates a number of cases of various forms of disease, in all of which the stomach was deranged and the saliva acid. We will quote a few of them.

A young woman was admitted into the hospital of La Charité, labouring under severe bronchitis, attended with great tenderness of the abdomen, excessive irritability of the stomach, diarrhœa, ardent thirst, &c. The saliva was strongly acid. The disease assumed in its progress a marked typhoid character, the tongue was parched and coated with a brown crust, the abdomen was always very tender; delirium and coma supervened, and the patient died on the tenth day after admission. The saliva was acid during the whole course of the illness. Dissection showed extensive disease of the mucous membrane of the stomach and intestines.

A young man was received into La Charité, as a fever patient. All the symptoms of ataxic* fever soon developed themselves. The saliva during the first days was only slightly acid, but later it became more strongly so; he died comatose. The saliva remained acid to the end. Dissection showed a fifth part of the mucous membrane of the stomach diseased.

A young man was admitted into the hospital as a fever patient. The symptoms were not serious: there was a yellow hue of the skin; the epigastrium was rather tender on pressure, there were, however, neither vomiting nor diarrhœa present; the tongue was white, and the saliva was alkaline. During the progress of the case the saliva became acid, continued to be so for three days, then became neutral, and as the patient recovered, gradually resumed its alkalinity.

In the case of a young man who exhibited the symptoms of gastritis, namely, great tenderness of the epigastrium, thirst,

* Ataxic, nervous or typhoid.

tongue red and parched, &c., the saliva was found to be decidedly acid. By repeated leechings of the abdomen, and the use of demulcent and refrigerant drinks, the symptoms were speedily relieved, and in a few days the saliva was quite neutral, having no effect either on the simple litmus paper, or on that which had been previously reddened by an acid. It soon regained its alkalinity.

This patient had two relapses of his complaint, and on both occasions the saliva was acid at first, and became neutral, and then alkaline, as the symptoms disappeared.

From these and similar facts, M. Donné inferred that acidity of the saliva was always attendant upon gastric disorders of a febrile character.

Professor Harris informs me that repeated experiments have satisfied him that the acidity is confined to the mucous secretions of the mouth; the secretions from the salivary glands never reddening the litmus held to the mouth of their ducts.

Schill observes that "carious teeth indicate long-continued irregularities of digestion. The teeth become very sensible (sensitive) in many nervous diseases, and in consequence of the presence of acid in the stomach. They are sometimes covered with a whitish or gray mucus: this occurs chiefly in catarrhs, and inflammations of the digestive and respiratory organs."*

When we remember the extreme susceptibility of the teeth to be decomposed by the action of acids (see page 44), we may well understand why caries is general, and hard to arrest. Providence has made the saliva alkaline, in order to protect the important organs it bathes, from injury by acid matters taken into the mouth, and also to moderate the acidity of the gastric fluids.

But under many morbid conditions, especially those most common to artificial life, the protecting fluid itself becomes the assailant, and the teeth, exposed at once to the attacks of acid aliments and drinks, and to the more constant action of acidulent saliva, soon yield to those corrosive agents.

* Schill's Semeiology.

This acid state of the saliva may accompany a vitiated condition of the fluids of the stomach, when no gastric suffering has attracted the attention of the patient, and the existence of any disorder in that organ has not been suspected. In such a condition of things, however, the dentist can afford only temporary relief, unless, perceiving the evil, he suggests such remedies as may relieve the patient of the disorder upon which the disease of the teeth depends.

The practitioner of dentistry should, therefore, be always prepared to test the quality of a patient's saliva, as regards acidity or alkalescence; and he should also be ready to give such advice as may be necessary, in consequence of any discoveries he may make.

When diseases of an acute character exist there will be no demand for the services of the Dental Surgeon, unless his mechanical assistance be required. It is not necessary, therefore, for me to treat of such affections. But it often will happen, that a patient will apply for operations upon the mouth, who may be affected with some subacute or chronic disease of his stomach, for which he is not under medical treatment. If the disorder be not very trifling, the dentist ought, in such cases, always to advise application to a judicious physician. But it will often happen, that the patient cannot conveniently procure such attention, or that the dentist may not have such confidence in the skill of the medical practitioner who could be procured, as to authorize him, as a conscientious man, to devolve the case upon another. He must therefore give the necessary advice himself.

In calling, therefore, the attention of the dental student to the consideration of dyspepsia,* as a common name for chronic diseases of the stomach particularly characterized by indigestion, I do not think I am in any degree leading my readers away from the studies proper to them.

DYSPEPSIA.

Dyspepsia or indigestion, representing any derangement of the function by which the aliment, after having been received

* Dyspepsia— $\Delta\upsilon\varsigma$, with difficulty, and $\Pi\epsilon\tau\tau\omega$, I digest.

into the stomach, is converted into chyle, must necessarily present a number of appearances, more or less characteristic of the particular trouble they represent, and the degree of its violence. It is therefore impossible to furnish a description sufficiently accurate and comprehensive to cover all the conditions of defective digestion which are included under the common name, dyspepsia. Several complicated organs are concerned in the process of digestion. These are connected together by the natural dependence of reciprocal necessity, and by powerful sympathies; and any of them, when diseased, may interrupt the functions of the others. To understand this subject well, it will therefore be necessary to have a complete knowledge of all the morbid conditions of all the organs of digestion, and of all the means likely, under any circumstances, to be useful in restoring them to healthy action.

Of course, it is not my purpose to discuss this subject in all its fulness of detail. It will be sufficient to impart such practical information, as may be easily remembered, and readily made availing by the dental practitioner.

The symptoms of dyspepsia vary much with the duration and nature of the affection, the constitution of the patient, his mode of life, &c.

Generally the appetite is capricious, sometimes very feeble. Heartburn, a sense of weight or distension in the stomach after eating, incapacity of digesting certain substances, such as oily matters, pastry, &c., costiveness, abdominal pains, weakness, depression of spirits, &c., are most prominent.

From the extensive sympathies existing between the stomach and brain, headache is a very common attendant upon dyspepsia. This is often very violent, and attended by nausea and vomiting. The patient soon learns by experience that he cannot take certain articles of food or drink with impunity, and every deviation from the diet suitable for him, is attended by renewal of symptoms and aggravated suffering.

Dyspepsia may be variously classified for the purpose of description and treatment, but the simple, plain, and practical distinction laid down by Dr. Eberle seems preferable for our

purpose to any of the more accurate, yet more complicated arrangements presented by other writers upon this subject. According to Dr. Eberle, dyspepsia may depend upon two distinct morbid conditions of the digestive organs, viz.: 1. On functional debility of the stomach from deficient or vitiated secretion of the gastric fluid, and muscular inactivity, independent of vascular irritation or inflammation. 2dly. On deficient or vitiated secretion of the gastric fluid with vascular irritation or chronic inflammation of the mucous membrane of the stomach and duodenum, and morbidly increased peristaltic action of these organs.

The characteristic symptoms of the former grade of indigestion, are weak appetite; tongue covered with white fur; absence of epigastric tenderness, except after a paroxysm of colic from flatulent distension; costiveness; acid and fetid eructations; absence of habitual tension and febrile irritations of the pulse; and the ability of bearing lean and tender animal food better than vegetable and farinaceous articles of diet.

The phenomena which characterize the second or inflammatory grade of the disease, are tenderness to pressure of the epigastrium, and particularly about the region of the pylorus and duodenum; a red, chopped, granulated or glossy appearance of the tongue; a firm, tense, small, and somewhat accelerated pulse, with slight manifestations of febrile exacerbations towards evening; emaciation; irregular action of the bowels, with frequent attacks of mucous, bilious, or watery diarrhœa; violent protracted pain in the lower part of the epigastrium during the process of digestion; fulness about the edge of the false ribs on the right side; an anxious and discontented expression of countenance; and inability, without great suffering, to endure animal food and stimulants. It appears that the irritative or chronic inflammation of such cases is seated in the mucous membrane of the pyloric extremity of the stomach, and of the duodenum, connected usually with a congested state of the liver, and often with fecal accumulations in the colon.*

* Eberle's *Prac. of Medicine*.

The causes of dyspepsia are :

1st. Hereditary predisposition. Some families inherit from their parents some peculiarities in the intimate organization of the stomach that inevitably result in dyspepsia of protracted and aggravated character, which makes its appearance about or soon after puberty, and continues with more or less intermission for years. This predisposition, however, is not of very frequent occurrence.

2d. Mental and moral causes, such as exaggerated passions; gloomy habits of thought; depression of spirits; over-anxiety of mind.

The influence of the feelings over the stomach is well known. Grief destroys the appetite, so do joy and ardent anticipation. Fasting is a natural exponent of sorrow.

3d. Irregular living, especially the artificial life of the fashionable world, which turns night into day and day into night; robbing the body of sleep when most disposed to and best prepared for it, and forcing the stomach, at unnatural hours, to eat heartily of the most indigestible and irritating kinds of food, if such ingesta can thus be called without impropriety.

4th. Excessive eating, and drinking, both of water and intoxicating drinks.

5th. Sedentary living without sufficient exercise.

6th. Unwholesome and insufficient diet. The use of pickles in excess, especially by delicate females.

7th. Want of healthful and sufficiently laborious occupation. It is owing to this, together with the adjuvant action of other causes which we have mentioned, that so many of the young women of our country are feeble, diseased, useless, and short-lived.

8th. The abuse of medicines, especially those of a purgative character. People have a wonderful disposition to be actively purged. Millions of pills, containing irritating and powerful cathartics, such as jalap, scammony, aloes, calomel, gamboge, and croton oil, are annually sold to persons whose only disease is too frequent purgation. The result often is chronic and incurable dyspepsia.

9th. Eating too fast, so that the gastric juice does not mingle with the food as rapidly as it is taken. Imperfect mastication, generally because of carious teeth.

10th. Extensive disease of the teeth, occasioning frequent and severe toothache, vitiating the secretions of the mouth, and thus furnishing to the stomach saliva of a bad quality. We have just seen that imperfect mastication may cause dyspepsia. Extensive caries interferes much with mastication. Moreover, pain disturbs digestion, and frequent toothache not only produces the common effects of pain, but from the position of the suffering, interferes with insalivation and regular eating.

11th. To all these causes may be added everything which tends to exhaust the vital energies, as every kind of excess necessarily does.

The treatment of dyspepsia consists first, in removing, as far as possible, all the causes of it. It will be useless to make an attempt to cure unless the patient will make persevering and self-denying efforts.

The patient must be contented to subsist upon such food as he can readily digest. The diet should be as dry as possible, for all drinks dilute the gastric juice, and when this is vitiated or deficient, dilution renders it still less efficient.

As to the character of food, it is exceedingly difficult to lay down a bill of fare which will suit all cases. The stomach, in dyspepsia, is very capricious. Some patients will eat with impunity what others cannot digest at all. I once had a dyspeptic female patient whose stomach revolted at the most simple and digestible substances, yet retained and digested comfortably, apple-pie and milk. Generally, the patient has learned, by repeated experiments, what food agrees best with him, and to this he should be confined.

In general, when the disease is simply one of debility without gastric inflammation, animal food answers better than vegetable. In selecting the particular kinds of animal food, we should avoid young meats. Veal, lamb, and young pork are very indigestible by weak stomachs. The mode of preparation

also is important. Soups of all kinds are pernicious, as they present the food to the stomach very much diluted and mixed with oily matters. Oils in all forms must be avoided, hence fried food, melted butter, gravies, most kinds of fish, &c., are inadmissible. All acid fruits, and the whole family of nuts, come under similar condemnation. Sugar is very apt to sour upon the stomach, especially if it be dissolved in warm water, as in the form of sweetened tea and coffee.

In these cases of debility of the stomach, a little brandy taken at dinner is often very serviceable. The remedy, however, is a dangerous one, and no prospect of advantage from it should induce us to advise it to one who has at some previous time been intemperate in its use. It is better for a man to be a dyspeptic than to be a sot; and reformed inebriates have seldom a choice between abstinence and excess. Indeed, every patient who may be advised by his physician to use ardent spirits, should be faithfully warned against the danger of acquiring an intemperate love of alcoholic excitement.

The medicinal treatment of such cases consists in the employment of such occasional purgatives as may be necessary to procure regular alvine evacuations; in the proper use of mild mercurial means to an extent sufficient to remove torpor of the liver; in the administration of alkalies, if the patient be troubled with an excess of acid; and finally, in the use of suitable tonics. All purgative medicines are not by any means equally well suited for the purpose we have indicated. Those of them which are very harsh and irritating, and those which produce watery and exhausting discharges, would be very injurious to dyspeptics. Indeed, we have enumerated the abuse of these cathartics among the common causes of the disease.

Rhubarb, from its aromatic and tonic quality, and its mildness, is one of the best medicines for habitual use, under these circumstances. Aloes is somewhat stimulating to the torpid intestine, and generally acts very gently upon the lower bowels. Blue pill mixed with either of the medicines above named, will often prove very advantageous, and calomel given occasionally in a decided dose will be very serviceable when

the liver is indolent, and its secretions deficient either in quantity or quality.

Of the vegetable tonics, the pure bitters, such as quassia and gentian are the best. But the preparations of iron are more likely to be decidedly advantageous.

We must not, however, expect a great deal from medicine in the relief of dyspepsia. At most it is a secondary means of cure. The removal of the causes and the rigid adherence to regimen, will, in most cases, ultimately procure relief.

It is very important that the teeth of dyspeptic persons be carefully examined, for often the cause, or at least a cause of the disease may be found in the diseased and defective condition of these organs, and a speedy cure be obtained by their removal.

As to the form of dyspepsia attended by sub-inflammatory condition of the lining membrane of the stomach, its cure must be devised upon the principles which govern in the treatment of similar conditions elsewhere. Moderate antiphlogistic means and mild farinaceous diet, will generally be attended with permanent relief, nevertheless the gastric surfaces, as the mucous membranes elsewhere, after having been inflamed, remain subsequently very susceptible to renewal of the disease, and the patient when relieved must be very careful not to presume upon the comfortable feeling of his stomach, and introduce into it stimulating meats, condiments, or liquors.

All dyspeptic persons should be advised to eat slowly and chew their food well. If the absence or bad condition of the teeth interfere with mastication, as they will often be found to do, the skill of the dentist must supply the deficiency, or repair the injury of those important organs.

Dyspepsia or indigestion expresses only the mal-performance of an act which is the result of the combined effects of various organs. Therefore, as failure of function in any one will interrupt the healthy completion of the great common purpose, dyspepsia must be a general term comprising several disorders. Being immediately connected with the digesting apparatus, and in fact forming an important part of that great

and complicated system by which aliment is received and prepared for assimilation, the dental apparatus can hardly escape injury when the other organs of this system are involved in suffering. Indeed, the mucous membrane, which in the stomach and intestine is the seat of the digesting process, and in the mouth is continually pouring out important fluids from its surface and glands, is so intimately connected with the dental arch as to unite it in close sympathy with the more important organs of alimentation. A healthy state of the fluids of the mouth is necessary for the safety of the teeth, and the secretions of the mouth will not be healthy when the functions of the intestinal canal membrane are disturbed. It is a hopeless task to save the teeth from caries while the patient suffers unmitigated dyspepsia.

Syphilis, also, by vitiating the general glandular and secreting systems, may produce a state of the buccal fluids very inimical to the structure of the teeth. This will only be the case in those secondary or constitutional forms of lues of which I have already written sufficiently when treating of ulcers.

Rickets very much delays dentition, and so impairs the structure of the teeth that when protruded they are very liable to decay.

The enamel of teeth formed under the influence of this constitutional vice, is often craggy and worm-eaten in appearance, though sufficiently hard. The fang during the progress of the disease has been found somewhat softer than natural.

The exanthematous febrile affections, which commonly occur in childhood, interrupt the regular deposit of bony matter in the growing teeth, and cause permanent defects, which are sometimes discernible in the external appearance of the organs.

Measles, for instance, often leaves evidences of its visit upon the enamel of the teeth, in the pitted appearance which they present.

As fever of all kinds is always attended with vitiation of the secretions of the mouth, we may readily perceive how any protracted disease of this kind may injure the teeth.

All serious diseases of the antrum must involve the dental

arch. Inflammation may be propagated, nutrition impeded, caries communicated, and the arch actually broken up in the course of those often fatal diseases which have their seat in this geographically important cavity.

The surgeon dentist should be well acquainted with the various disorders and morbid growths which may be developed in the antrum. Early detection is often necessary to cure, and none is so likely to have the opportunity of early discovering the hidden mischief, as the dentist. The first symptoms of the disorder are often felt in the teeth, and unless the dentist who may be consulted shall be able to point out the true nature of the evil, delay may be occasioned, and delay may be fatal.

Mercurial salivation (ptyalism) has often caused extensive devastation in the dental arch. Mercury, like all other of heaven's boons, has been shamefully abused, and serious and even fatal injuries have resulted from the reckless administration of this most useful medicine. Unhappily, the occurrence of such calamitous accidents has induced such general and unreasonable prejudice against the use of mercurial medicines, that vastly more evil is now suffered by society from the improperly withholding, than injudiciously using them. The feeling against mercury has been the common hobby-horse of charlatans and unprincipled doctors, and it needs no little firmness to enable a physician to deal honestly with his patient in the use of this drug. From the fact that salivation is injurious to the teeth, dentists have been led to comment severely on the use of calomel, and thus have done much to spread abroad terrible notions of the evils inseparable from the employment of this and other mercurial preparations. Some of these censorious gentlemen have seen evidences of mercurial devastation in every form of disorder and variety of decay, and to them calomel is the one thing to be avoided by all who live to eat, or eat to live.

Doubtless salivation, especially if profuse, must be destructive to the teeth, and fortunately it is at length understood that ptyalism is not, by any means, necessary to the attainment of all the benefit of mercury. Salivation is an accident always

to be dreaded, and as far as possible to be avoided. Yet even at the risk of it, mercurial remedies are indispensable, inasmuch as life is more important than teeth.

There is no reason to believe that the use of mercury is injurious to the teeth, when salivation is not induced; yet caries of these organs is very often attributed to it. People are exceedingly apt to confound the *post hoc* with the *propter hoc*,* and dentists are as liable as other men to fall into the error. A patient who has escaped a severe attack of fever, finds his teeth rapidly decaying; in great alarm he applies to the dentist. The latter glances at the mouth, and with a look of boding sagacity, inquires if the patient has not been taking calomel. The patient replies that he has been taking more or less of it, and then the man of science, as he is presumed to be, launches forth for the hundredth time into a bitter diatribe against mercury as the origin of all the evil.

And why might not the lamented caries be as justly charged upon the tartar emetic or magnesia, which the patient may have taken simultaneously with the calomel? or why does not the dentist seek for the all-sufficient cause of devastation in the fact that the teeth in question had been bathed in the acid saliva of a fevered mouth for weeks consecutively? Why transfer the blame to the remedy by which the fever was subdued, and cast implied and serious censure upon the physician, whose judicious employment of the vilified drug has, perhaps, saved the patient's life?

Until I have other information than I now possess, I cannot believe that the proper employment of mercury is injurious; and while I reprobate its abuse, and would think the physician unpardonable who would be careless or reckless in the use of a medicine capable of doing so much harm, I cannot but regard that man as the author of greater evil, who by silly declamation against an important remedy, fetters the practitioner in his contest with the most formidable diseases.

Scrofula, to which I have already called attention, interferes with assimilation, and consequently with the completeness of

*To consider whatever occurs *subsequently*, to be *consequent* upon what has been observed to precede it.

nutrition and growth. Being often inherited and developing its mischievous nature very early in life, it influences the teeth during the important process of formation, and by preventing their perfect organization renders them feeble to resist the influence of morbid causes.

This evil consequence is, however, generally counterbalanced by the thinness and deficiency of mucous and salivary fluid, and the difficulty with which the fluids of the mouth of strumous persons become acid.

Pregnancy is supposed to be fraught with danger to the teeth. Indeed, this opinion has been sufficiently general to have become condensed into the adage—"for every child a tooth"—meaning that the mother may expect to lose a tooth as the result of each pregnancy.

Pregnancy is not disease: it is a physiological condition, and we cannot believe that it is *per se*, and naturally, a cause of disease anywhere, especially in organs distant and not immediately dependent upon the uterus. But in pregnancy, the nervous system is irritable, and the sympathies of the body are in more lively play. The vascular action is also greater, and the blood is more highly charged with fibrine. It therefore happens that there is more liability to pain than at other times, and less patience to endure it. Consequently, if the woman has any diseased teeth, previously neglected, they will be apt to ache, and when aching, the pain to her irritable nerves is intolerable. Besides this, there is occasionally a sympathetic toothache, which, though it cannot be directly traced to the uterus, appears to depend upon its gravid condition, and not upon disease of the tooth itself. The dentist should be aware of this; it is readily alleviated by an anodyne.

It also happens very frequently that the artificial life and the absurd habits of our young females, induce a constitution but little capable of sustaining childbearing, although to the woman of good health and vigorous frame, parturition is fraught with no disadvantage to health or shortening of life. These pallid, soft, and delicate girls, when become pregnant, begin rapidly to break down, and the hurried caries which destroys

their teeth is but the first manifestation of the premature decay of the whole body. This is a subject upon which I could and would willingly write much, but it would be useless.

Fashion, custom, inclination, will bear sway over reason and moral obligation ; years of comfort will be sacrificed for hours of mirth ; showy dress and ball-room vigils will continue to feed the insatiable tomb with the loveliest of our race.

CHAPTER XIV.

MORBID EFFECTS OF CONDITIONS OF THE TEETH AND GUMS,
UPON THE GENERAL SYSTEM.

HAVING considered the several forms of disease in other parts, or of the general system, which morbidly affect the teeth, I proceed to inquire what effect these latter organs, in their varied states, whether physiological or pathological, may induce in other parts, and what changes they may cause in the more general phenomena of vital action.

As the body is a unit, knit by the closest bonds, pervaded by one system of blood-vessels and nerves, directed by one intelligence, and kept in a continual relation of function and expression by an all-pervading law of reciprocal reaction and sympathy; as diseases of other parts, and those which in distinction to well-defined and limited affections we call general, are capable of affecting the teeth, it might be apparent, if we had no particular facts in evidence, that the morbid condition of the teeth may produce corresponding evils in other parts, and may even involve the whole system in troubled and morbid action.

It might also be evident that severe and long-continued pain, located in the immediate vicinity of the brain, and in parts little accessible to soothing appliances, cannot be less dangerous to health than pain in other organs situated at greater distance from the nervous centres and more easy of access.

It might also be perceived that sensitive organs, in immediate contact with the great lining membrane of the thoracic and abdominal cavities, and intimately connected with it by function, cannot be less capable of propagating disorder to it,

than parts located far from it, and having no immediate relation to it.

Yet natural as these inferences seem to be, they have been, until lately, almost entirely overlooked, and even now the medical profession are by no means awake to the facts and the importance of the morbid relation actually existing between the teeth and other parts.

It is exceedingly uncommon to hear that a physician, in searching for obscure causes of protracted ill-health, has paid any attention to the state of the teeth, though often their terribly diseased condition cannot escape involuntary recognition by more of his senses than one. The matter is never alluded to in lectures delivered to medical classes, and, in fact, is hardly recognised at all as a subject for pathological or hygienic consideration.

Within a few years, however, several writers upon dentistry have urged the medical profession to turn their attention to the diseased conditions of the teeth in connexion with other disorders, and they have supported their appeals with such an array of well-observed and clearly narrated cases as must impress the mind of all reflecting readers with the fact of the morbid relations in question.

Unfortunately, these writings are not read by the general practitioner, and it is to be feared that a long time must elapse before physicians become properly informed upon this subject. In the mean time it is the more important that every dentist be able to perceive these sympathetic conditions, and call the attention of the patient and physician to them.

The teeth, while in a physiological condition, are capable of inducing great local distress, and constitutional disorder even of a fatal kind. During their evolution and passage through the gum, the pressure even of a sound tooth upon a sound gum may be attended by irregular phenomena of the most alarming description: it would be strange indeed if the action of a diseased tooth upon the diseased gum should be attended with no evil consequences.

That the process of dentition happens in infancy, causes

certainly a modification of effect in accordance with the peculiarities of the infantile constitution ; but, the action of morbid teeth upon the less mobile nerves of the adult may be as certain, though less rapid and ostentatious.

The question, however, like other medical questions, is one of fact, not of inference. And I would leave the truth to be deduced from a fair examination of subjected cases.

CHAPTER XV.

MORBID EFFECTS OF FIRST DENTITION.

DENTITION is not, in itself, a morbid process, but a healthy physiological act. It would be strange, therefore, if it necessarily involved disorder of function and serious consequences to the subject.

The truth is, that when naturally performed, under the favourable circumstances of sound constitution and good health on the part of the child, the cutting of the teeth is effected without pain or any collateral evil, these organs appearing in their place without any previous unpleasant sensations to attract attention to their progress through the gum. It is thus that the domestic animals perform dentition; and many children complete theirs with no more perceptible inconvenience.

More generally, however, the child experiences, at least with some of its teeth, more or less suffering of a local kind, and in many cases the pain is attended by sympathetic irritation of a grave and not unfrequently of a fatal character.

It is important to know that, however large may be the proportion of painful, in comparison with natural dentitions, the former are nevertheless to be regarded as accidental modifications of the regular and healthy process. Starting with this knowledge, we will, of course, be led to inquire into the causes, so general and so potent, which effect the changes in question, and to devise means and management most proper for escaping or annulling them.

Does painful dentition depend upon the pressure exercised by the tooth upon the gums?

If it did, all children would experience suffering and more or less collateral morbid effects. For, although the difference

of natural sensibility in different children would occasion differences in the degree of trouble arising from this cause, yet this comparative sensitiveness, being merely natural and healthy, could not account for the extreme contrasts exhibited between easy and simple, and complicated and dangerous dentition.

Nor is it at all likely that extreme sensibility would escape morbid manifestation during the rapid evolution of infantile life, until awakened from its passivity by the evolution of organs themselves not sensitive (in their healthy state), passing through structures not by any means remarkable for this quality, and performing their eruption so gradually as to make no sudden demands upon the nervous and vascular system, so as to disturb the equilibrium of nervous and vascular distribution.

Nor is it consistent with the facts observed in the history of dentition that the cause of the suffering is the pressure of the fangs of the teeth upon the periosteum of the alveoli. Those who adopt this explanation have not considered that the shooting of the teeth, characterized by the enlargement of the alveolar walls, and the distension of the gums occasioned by the formation of the body or of the crown of the teeth, is an epoch often more dangerous than that of the organization of the roots; which besides would do much more harm in compressing and binding the soft and pulpy part of the tooth than the serous membrane, which performs the functions of a periosteum and lines the interior of the gum and proper cavity of the teeth.*

The truth seems to be, that a great number of children are born into the world so feebly or disproportionably constituted that they are not capable of maturing. Most of these necessarily perish during childhood, by some of the many forms of disease common to that period. Many others, though born with sufficient vigour, are reduced by bad diet and defective management to a condition which readily yields to irregular or morbid agents.

* Baumes on First Dentition.

A child may be very feebly organized, and yet may appear for a time plump and healthy, but when the vital powers come to be tested either by accidental or physiological demands upon its energies, the natural feebleness is ascertained by the development of various morbid phenomena, indicating the particular location and kind of disability.

Again, children born healthy are often subjected to privations or to injudicious diet and regimen which rapidly alter their fluids and tissues, and lay the foundation for serious accidents.

Dentition demands a certain amount of constitutional energy to accomplish it. The rapid development of any organ does this. The changes which take place at puberty, and the evil consequences, to the feeble, of the developments then completed, are illustrative of this fact. This demand is the severest test of functional and organic completeness in the child, and many will not bear it.

The development of the teeth determines an unusual flow of blood to the head. This happens at a time when the brain is proportionately large, and undergoing rapid evolution. Independently of dentition, this period of life is attended by a strong tendency to cerebral affections, and to pulmonary and abdominal complications. The nervous and vascular systems are, in the child of this age, remarkably active. The several organs have to perform not only their functions and the preservation of their entireness, but also rapid growth. Animal life is therefore exalted with all its qualities. Among these are sensibility and sympathy; the capacity to be impressed and to propagate impression. Hence a slight cause may produce great local or constitutional effect, and disease of any kind may induce sympathetic or constitutional disorder apparently much out of proportion to its own intensity or importance.

In the older child the relation of secondary to primary affections is more equable, and the second dentition is performed without the occurrence of those serious constitutional affections which so frequently attend the first.

Any unnatural obstacle or impediment to the eruption of the

first teeth, will tend very materially to augment the probability of morbid consequences. A disproportion between the teeth and the jaw, or the unusual hardness and impenetrability of the gum, are of this nature, and sometimes provoke local and sympathetic disturbance.

The appearance of several teeth at once may make a larger demand upon the system than it can readily meet, and hence cause embarrassment, or if their dentition be painful, the amount of suffering may be too great for the sensitive and sympathetic nature of the child, especially if it be constitutionally feeble.

The natural symptoms of healthy dentition, are not remarkable. An increased flow of saliva is usually noticed, though this perhaps, is not as certainly the consequence of dentition as is generally supposed. The mouth of infants is generally well supplied with fluids, which, there being no teeth to prevent it, will escape more or less from the mouth. The child also carries its fingers to the mouth more frequently, and seems pleased to press a resisting substance between its gums. Gentle friction of the gum also seems to be agreeable. The gums are noticed to be hot, and the child takes the breast frequently. The bowels are generally looser than usual, and the child ordinarily manifests some little restlessness and sleeps less profoundly than previously.

These symptoms precede the eruption of the teeth by several weeks, and seem to depend upon the rapid ossification and growth of the teeth. After a few days, they often subside, to be renewed when the teeth are pressing forward and about to penetrate the gum.

It is common to alleviate these little inconveniences, by giving the child a coral, crust of bread, or other hard substance, to press upon with its gums.

Nature is generally a very correct guide as to her own wants, and as it is natural thus to allay the sensation of the gums at this period, it must be right. A priori, however, we might have feared that the continual pressure would condense and harden the gum, and make it more impenetrable.

Inasmuch as nature has not indicated the precise degree of assistance proper for the purpose, it would be well to use substances which do not possess this quality in an unnecessary degree.

The French use a stick of marsh mallows, or liquorice root dipped in honey, or a sweetened decoction of barley—the Germans, a small bag filled with sugar and spices. It is doubtful, however, whether the success of this invention for quieting the child may not induce the nurse or mother to neglect it, and withhold the breast which it would take eagerly and frequently. Nothing so soothes the infant as the frequent lubrication of the mouth with the mother's milk, and where nothing in the state of the mother's health or the condition of her breast forbids this indulgence, it is cruel and unnatural to deny it. It may be, too, that the constant use of sweet and condimental substances would disorder the stomach of the child; an accident to be studiously avoided during teething.

The bowels are generally loose during dentition, and even when the purging is very frequent we must not consider it excessive while the child nurses freely, and especially while it does not emaciate.

Costiveness is much more to be feared under such circumstances than purging. It is unnatural, and unless overcome by proper treatment will result in irritations, local, and perhaps sympathetic, which may not easily be remedied.

It is always important to restrict a teething child to proper aliment. The bowels may very readily be irritated, and the system is so liable to violent excitement at this time that all irritation should be dreaded, especially irritation of the abdomen, for this is the most important part of a child, being the centre of the very active processes of nutrition and augmentation everywhere going on. This is no time to try experiments upon the stomach. Nutritious and easily digested food, and that which is free from acidity, is to be given, and in such quantities as the child is willing to take. Unless, indeed, it has been habitually over-crammed and taught to eat an unnatural quantity.

When the mother has milk, this is, of course, the best food for the infant, but it will generally happen that the child will require more nourishment than it can obtain from this source.

In selecting food for it, regard must be had to the condition of the child. If delicate and thin, animal food will often be indispensable. Beef, mutton, and occasionally a little salt meat may be given with advantage. Young meats are gelatinous and less digestible, and should be avoided.

If the child, on the contrary, be too fat, if it has been over-crammed with milk until it presents an appearance similar to that of the show calves, stuffed and swollen for exhibition at a fair, it should have diet of a far less nutritious kind. Farinaceous articles well diluted with water will be more suitable.

Milk, if fresh and sweet, generally agrees well with children; but the milk of the cow is more nutritious than that of the mother, and should be diluted. Cream freely diluted with water generally agrees better than milk.

It is common among the rich to thicken the child's milk with arrow-root, *tous les mois*, or other concentrated farinaceous food. The consequence generally is that the parents are enabled to rejoice over fat babies, and soon to sorrow over sick ones. Instead of making the milk of the cow more nutritious, it should be rendered less so than natural. It is rarely that articles of this kind, even when they are what they are represented to be, are fit for children. But this is rarely the case. Most of the arrow-root, &c., of the shops is potato starch.*

Some parents are in the habit of refusing children flesh of all kinds, and indulging them freely in milk and potatoes. The result generally is to fatten the children excessively, without providing them with a proportionate amount of muscular fibre.

The child should have as much exercise in the open air as the circumstances of the parent will admit. All kinds of exercise seem to do it good. It is seldom fatigued even by very long rides, and rarely fails to acknowledge, in its altered ap-

* If the milk require the addition of any farinaceous substance, I prefer rice flour.

pearance, the good effect of even an hour's exercise in the fields.

Frequent bathing is of great use to children of all ages, but even this means requires to be administered with judgment. The cold bath is a powerful remedy, and cannot be used with equal safety and advantage upon all children. Those who are ruddy and robust will bear it well; while others who are pallid and of cold skins may suffer serious injury from it. If after the bath the child shivers for a considerable time, and remains cool, and if it contracts a dread of the water, the temperature should be elevated to meet the condition of its sensibilities.

Of course, in cold weather, the water should always be warmed in proportion to the necessities of the case.

When dentition becomes complicated with morbid conditions, directly or indirectly connected with it, the management of it requires far more care and skill. The local symptoms are to be allayed, serious symptomatic affections are to be relieved, and the strength of the child to be supported through a tedious process, in which the powers of the system are taxed to their utmost capacity. A single mistake here will often prove fatal, and it is easy under such circumstances to make mistakes.

The diseases of dentition are *local*, those which affect the teeth, gums and mouth—or *sympathetic*, those which manifest themselves in other organs.

The local diseases of dentition are, first, inflammation of the gums. These are swollen, hot, redder than common and very sensitive. The child will not permit them to be touched, and incessantly craves the breast, or cold liquids. The condition of the gum is almost always attended with more or less fever and irritation of the intestinal canal. There is also an evident determination of blood to the head. The face is flushed, the head hot, the eyes red and watery, the flow of saliva profuse, and sometimes the salivary glands are swollen and tender. Aphthous exudations are often noticed, and it is said, though this must be very uncommon, that abscesses sometimes occur at the root of the tongue.

The fever is generally ardent, and increases and subsides

with remarkable suddenness. The thirst attending it is very great, and a strong tendency to irregular muscular contractions or convulsion is generally observed. The sleep of the child is uneasy and frequently interrupted. It often starts and screams, and when awake is usually fretful and stupid by turns.

These symptoms are often very suddenly and effectually allayed by freely incising the gum and capsule down to the tooth or teeth, and liberating them from their investments. This expedient is generally resorted to whenever the gum is elevated and distended; sometimes, however, it is of no avail, either because it is not effectually done, or because the symptoms to be relieved do not in fact depend upon the mere mechanical pressure.

The French writers make a formidable matter of this little operation; and indeed, as practised by some of them, it is no trifle, for they make a crucial incision upon the tooth and dissect up the flaps of the gum, or else, with a bistoury, completely cut off the top of it.

There is no necessity for such painful and protracted operations; a free incision, until the lancet grates upon the tooth, is all that is necessary for the incisors; and when the double teeth are in question, a cross incision may be added.

The lancet should be carried down to the tooth, or else no good will be done.

The bleeding which results is trifling and salutary; tending to relieve the inflamed and swollen gum.

It has been objected to this operation, that unless the tooth should be very near the surface, the incision would heal and the cicatrix would offer more resistance than the original structure of the gum.

The fact is, however, that if such a cicatrix should occur, and the symptoms return, it would be very easy to divide the gum again; moreover, a cicatrix is always a feeble tissue, which is far less resistant than the natural part whose loss it represents.

Conjointly with the use of the gum-lancet, attention must be paid to the bowels of the child. If it be costive, the torpor of

the bowels must be relieved by the administration of proper purgatives. Of these, calomel is for several reasons by far the most useful, and is equally safe, for occasional administration, with the most innocent of the class.

In these conditions the abdominal secretions are always vicious, and we have no means so powerful as calomel for the restoration of impeded or altered secerning function. To a child of a year old, four, and to one of two years, eight grains should be given at a single dose; and, if necessary, its cathartic effect insured by the subsequent administration of castor oil or magnesia.

Small doses of calomel are ineffectual, and, if frequently repeated, are dangerous.

Should the bowels be too loose, and the passages thin and white, the same medicine, similarly administered, or joined to a little rhubarb or chalk, will generally check the diarrhœa.

In these cases, as where constipation exists, the fault seems to be in the defective or altered secretion of the liver, which calomel restores.

The fever will generally abate in proportion as the bowels are put right. Should it continue ardent, however, and especially if the cerebral plethora should increase or remain unabated, a few leeches behind the ears will often prove serviceable.

The cold bath, or sponging with cold water, will also allay the fever and restlessness. The warm bath may sometimes be preferable, and will be equally serviceable. Above all, country air, and exercise out of doors, are the best means of combating the disorders of dentition.

“Very different,” says Mr. Jay,* “was the practice of our forefathers, who, misled by the fanciful doctrine of signatures, were in the habit of applying to the gums specific ointments made of the brains of hares, or of the combs of cocks, which as old Hartman would have us believe, ‘cause the production of teeth without difficulty, and free from accidents.’”

* Cyclop. of Prac. Med., Art. Dentition.

It is questionable whether we have much right to laugh at the metaphysical medicine of our ancestors: certainly our posterity will find abundant occasion to ridicule our own.

We have yet to learn that any ancient theory or practice of cure was more utterly absurd than Homœopathy or the cold water treatment. The doctrine of signatures is quite as philosophical as Mesmerism, and the combs of cocks and brains of hares are certainly as efficacious as Hahnemann's dilutions.

Among the local diseases of complicated dentition we must enumerate caries of the tooth and abscess of the gum. When from any cause, local or constitutional, caries of the tooth takes place, it engenders inflammation of the periosteum, which soon extends to the gum. This becomes painful, swollen, and tender; an effusion of fluid takes place between the fang and its investing membrane, which thus becomes a sort of cyst or sac; finally pus is formed, an abscess appears, and the matter is voided, either by a spontaneous or artificial opening.

The continuance of the carious tooth as an irritant will, of course, prevent the proper healing of the ulcer, and the fungus, so common in carious ulcers, will shoot up.

"In other cases the pressure of the abscess having produced absorption of a portion of the alveolar process at its lower part, it effuses its contents through the aperture thus formed, and the matter insinuates itself along the surface of the lower jaw, and forms an internal tumour near its base. This tumour is at first hard and discoloured, but in the course of time it ultimately inflames, and bursting or being opened, leaves a puckering in the integument, which, adhering to the bone, remains a permanent blemish. When the diseased tooth, which is the cause of the mischief, is removed before external redness takes place, the tumour ultimately retires, and leaves the skin unblemished."*

A spongy condition of the gums, in which they bleed freely at the slightest touch, is sometimes observed in dentition. Ulceration sometimes attends this condition. Weakened

* Coleys' Diseases of Children.

digestion, and consequent imperfect preparation of chyle and insufficient nutrition, may be considered the cause of this affection.

Treatment.—Inflammation of the gum may be very much abated by the application of a leech to it. In order to do this with facility, a thread may be passed by a needle through the extremity of the animal, and it then may be enclosed in a glass tube. When the inflammation has subsided, the carious tooth should be extracted.

Should an abscess occur from a similar cause, extraction must also be resorted to.

Sponginess and ulceration of the gums, depending upon a depraved digestion, must be met by such means as will restore the alimentary canal to the regular and complete performance of its functions.

Mild astringent lotions, such as myrrhine and aluminous solutions, may be simultaneously employed.

CHAPTER XVI.

SYMPATHETIC DISEASES OF DENTITION.

A VAST number of diseases have been described by different authors, as the results of dentition. The recapitulation of them would show a crowded list of formidable complaints, from which it would seem that no child could escape. Dentition appears in this exhibition as the Pandora's box from which all manner of evils are successively let loose to worry and destroy the devoted infant. Without pretending to enumerate the forms of disorder attributed to teething, I offer the following as a specimen: Vomiting, anorexia, diarrhœa, cholera, costiveness, increased or diminished urine, urethral or vaginal discharge, with painful micturition; dry cough, dyspnœa, catarrh, pneumonia, spasmodic affections of the face, limbs, glottis, &c., insomnia, agitation, and fright on awaking; epilepsy, somnolence, stertor, coma, transient palsy of the arms and legs, ophthalmia, hydrocephalus, marasmus, eruptions, especially about the head and face, swelling of the hands and feet, enlargement of the cervical, femoral, and mesenteric glands, and other scrofulous affections.

Although any of these disorders may, and all of them do occasionally occur during dentition, it does not by any means follow that teething is the cause of them. The mucous membranes of children are very liable to inflammatory affections, and their brain is very liable to sympathize with these and other disorders. Moreover, the process of dentition would certainly afford an awkward complication to any of these forms of disorder occurring simultaneously with it, or provoked by accident during the progress of teething. No doubt, also, dentition itself, especially if obstructed, or otherwise irregular or

morbid, may become the exciting cause of any disorder to which the child may at the time happen to be most prone.

Should inflammatory affections of mucous membranes occur during dentition, the treatment should be regulated by the nature of the particular case, and the judgment of the physician. It would always be well, however, to examine the gums carefully, and to incise them freely if they be at all swollen. This can do no harm, and sometimes will result very happily.

Very often, perhaps most frequently, the mucous affections are not inflammatory, but consist in a kind of morbidly increased sensibility, which we call irritation. The irritability of the stomach, the vomiting and purging are frequently of this kind, and would only be aggravated by antiphlogistic treatment.

Proper purgatives, especially calomel, proper food, and sufficient exercise, will be found to accomplish all or nearly all that art can do for the relief of such conditions.

The cough which accompanies dentition is also due to the irritability of the mucous membrane, and needs no special treatment.

The inexperienced practitioner must be careful, however, not to confound this condition with proper catarrh or pneumonia. Children are liable to severe pulmonary disorders, which require the most prompt and vigorous treatment, and which it would always be serious and often fatal to neglect.

The febrile disturbance, the quick, short respiration, the distended nostril, and the indescribable, yet intelligible appearance of the little patient, will render mistake entirely unnecessary.

The most serious complication of dentition is undoubtedly a gastro-intestinal disorder, which has acquired the name of Cholera Infantum.

This disease occurs only in hot weather, and is almost peculiar to cities. Occasional cases of it, however, occurring in warm, unsheltered places in the country, are sufficient to show that its urban character is dependent simply upon the heat of cities, which especially at night is very much greater than is

experienced in rural situations, unless very unfavourably circumstanced.

This disease seems closely connected with dentition, for although very young infants may be attacked by it, they are by no means so liable as those who have completed their first year. Hence the familiar danger of the child's "second summer."

The disorder usually commences by purging; frequently as the immediate consequence of some indigestible substance taken into the stomach, but often without any known exciting cause. The matters passed at first are light green—presenting somewhat the appearance of chopped grass, and gradually becoming paler until they are of an extremely pale yellow or absolutely white. Vomiting, especially after swallowing liquids, generally attends the diarrhœa, and commonly fever of a fickle fluctuating character also occurs.

The child emaciates very rapidly, and in a few weeks or days will be reduced to a mere skeleton, and be too feeble to stand alone. The brain and nervous system become torpid, the muscles relaxed, the child somnolent and stupid, and death, from cerebral congestion or convulsions, closes the scene.

The disease is sometimes acute and rapid in its development and progress, at other times chronic. The only medicinal agent which is uniformly beneficial in this disease is calomel. The nature of the alvine discharges evinces a deficiency or entire absence of bilious matter. A full purgative dose of calomel rarely fails to restore this secretion, and all the symptoms are alleviated by it.

From the fact that this medicine can be given in small bulk, that it is almost tasteless, and that it will remain in the stomach which rejects all other drugs, it is peculiarly adapted to the condition in question. As this adaptation makes it the most available, it is exceedingly fortunate that its medical qualities make it by far the most efficient of remedies in this disease.

Some writers recommend it to be given in small doses, frequently repeated, but while there is no advantage to be gained

by this procedure, there is risk incurred of mercurializing the child ; which would generally be fatal to it. It is true that this rarely occurs ; but some children have a peculiar constitutional susceptibility to mercurial action, and it is better to risk nothing unnecessarily in this respect.

The dose which experience leads me to employ, is from five to ten grains, according to the age of the child and the condition of its sensibility. It may be repeated several times within a week or less, if necessary.

Alkaline medicines, soda, potassa, magnesia, and chalk, are also useful in neutralizing acid, and, perhaps, also in correcting the disordered condition of the mucous membranes.

A cautious yet bold use of opium, will often render service which no other treatment will afford. It quiets the stomach, soothes irritation, checks the diarrhoea, and gives refreshing sleep.

The great difficulty in the treatment of this disease arises from the fact that it is the result of causes which continue to act ; so that the disorder is constantly reproduced.

These causes are heat and dentition ; and it is often impossible to cure the child while the causes continue to act.

In large, well-ventilated rooms, it is often possible, even in cities, to procure for the child a temperature which is salutary ; but even under these circumstances it is not always possible to do so. When, therefore, the little patient is the child of poverty, imprisoned in the small room of a small house, shut up in a court or alley, it is almost impossible to rescue it from death.

The most certain of all remedies is to take the child to the country. There proper medical treatment will rarely, or never, fail to cure the disease. Children in apparently the last degree of prostration are sometimes revived as by miracle, by the cool air of the country.

But when we say country, we do not mean a hot room near the roof of an unshaded tavern fronting on a turnpike road, where numbers of sick children are shut up together, in a temperature perhaps higher than that of the spacious city man-

sions from which they have been hastily removed. Shade and green grass are essential. There must be no bare surface to reflect the heat, and there must be shade where the child may be exercised, and where it may be conveyed in the middle of the day, when country houses are as warm, and often, from their size and construction, warmer than city dwellings.

Convulsions very frequently occur during dentition. They are of an epileptic character. The symptoms are a fixed stare and often distortion of the eyes, insensibility and frequent irregular contraction and expansion of the muscles, generally of the limbs and face. The jaws are firmly clenched, and the saliva is ejected in froth from the lips.

This is a very frightful and generally very alarming affection, though not very often fatal.

Convulsions during dentition may be excited by several causes. The first and the most common is the eating of crude and indigestible matters; secondly, fever; and thirdly, the irritation of the teeth themselves: often two, and sometimes all three of these causes act together.

The convulsion generally passes off in a few minutes, but another will occur unless the cause be removed. Sometimes it will continue with little or no mitigation for hours, and sometimes it continues until the death of the patient. In order to relieve the spasms, it is generally sufficient to put the extremities in warm water and pour cold water on the head: if this do not speedily accomplish the end, more active means must be used, and such as look to the removal of the cause.

If spontaneously, or by use of the bath, the convulsion subsides, we should carefully inquire into the cause of it. If the child has recently eaten anything, it should be immediately vomited, and indeed this can rarely be amiss, for it is often impossible to elicit the necessary information, until the presence of the ejected matters exhibits the cause of irritation.

If the child have fever, it should be bled, in order to relieve the brain, which is suffering from the rapid circulation of blood through it. This may be done either by the lancet or by leeches.

If the gum be swollen and tense, and the child seems to be

suffering from this cause, a free incision will often relieve the tendency to spasm, by allaying the local, and with it the cerebral irritation.

Finally, if the child be costive, its bowels should be immediately opened by injection, and subsequently by a purgative dose of calomel.

Dr. Underwood describes a peculiar swelling of the hands and feet as a casual attendant upon dentition. He considered it, however, as rather beneficial than otherwise, as it ceased spontaneously with the appearance of the teeth.

Cutaneous eruptions frequently occur during dentition, but they are of little consequence, as they spontaneously disappear, and, in some instances, may be considered as a salutary diversion made by nature for the relief of the brain. Sometimes, however, they are so disagreeable, that some efforts are demanded for their relief. Most, or perhaps all of them, occur independently of dentition, and as a description of them would be tedious, and without plates, unsatisfactory, and as they are all fully described in works specially upon this subject, it will only be necessary to do little more than name them here. The curious student may seek further information from writers upon cutaneous disease.

The principal varieties are, an erythematous efflorescence behind the ears, called, in medical language, *intertrigo*; *crusta lactea*; the several varieties of *strophulus*; small *phlyctenæ*, or blisters, and evanescent red spots.

Although these eruptions occur frequently during dentition, they are by no means peculiar to this period, and it is difficult to show that they are necessarily connected with the cutting of the teeth.

INTERTRIGO.

This is a kind of erythemic or superficial inflammation of the skin, generally attended with some exudation of a semi-purulent matter, occurring behind the ears. When the two excoriated surfaces rub upon each other, the result is frequently a very ugly superficial ulcer. The disease can be readily cured by the use of absorbent or "drying" powders.

All moist applications do harm. A most valuable prescription for this and similar conditions of the skin is a powder composed of two parts of lapis calaminaris, and one part of calomel, rubbed together in a mortar. This is to be freely dusted upon the sore by means of a little raw cotton, several times a day. It will rarely fail of success.

There is an opinion very prevalent that it is hazardous to dry up these eruptions, but, according to my observation, there is no ground for this supposition.

CRUSTA LACTEA, OR MILK CRUST (PORRIGO LARVALIS).

This eruption appears with white vesicles, speedily passing into dark-coloured scabs, itching and ichorous, and frequently covering a large part of the face, head, and sometimes other parts.

The eruption is very ugly and unpleasant, but is rarely injurious to the child. The little patient is generally plump and hearty. Indeed, the disease seems rather to depend upon a plethoric state, than upon any morbid condition of an important nature. The teething is not impeded by it.

Crusta Lactea is often obstinate and of some months' duration. The only serious attendant upon the disease is the itching, which is sometimes so annoying to the child as to cause it to fall away, and become sallow, &c.

No treatment is required, or, rather, none does it much good. The bowels should be kept free, and the itching allayed by warm bathing, lotions of weak spirit and water, and solutions of Sul. Zinc.

Where there is much discharge from beneath the scabs, the drying powder already mentioned is a good application. As a general rule, the less we do to cure this affection the better. Time will certainly restore to the child its natural skin; medicine might, and if persevered in, would destroy its appetite, tease its stomach, enfeeble its health, and, after all, produce no effect upon the eruption, except, perhaps, to make it worse.

STROPHULUS, TOOTH RASH, RED GUM.

This is an eruption very common to nursing children. It

consists of red or white and itchy papulæ evolved upon the face and lower limbs, disappearing and returning, and ending generally in the throwing off of a kind of powdery desquamation.

The papulæ present differences in size and appearance, which have given origin to different designations. When vividly red, prominent, scattered over the cheeks, face, arms, and dorsal aspect of the hands, and intermingled with erythematous patches of varying extent, it is called *Strophulus Intertinctus* (Rayer.)

When the papulæ are white, large, and without surrounding redness of the base, the affection is called *Strophulus Candidus* (Willan.)

When the papulæ are very thick, smaller, and confluent, Willan calls it *Strophulus Confertus*; and finally, *S. Volaticus*, when it occurs in circular patches, or clusters, here and there, on the surface. All those forms of strophulus may affect the child at the same time.

It is not by any means a serious affection, though it sometimes torments the child by the itching it causes. To allay this, we may use the cold or warm bath, purgatives, and cool dressing; for the sufferings of the child may be very unnecessarily aggravated by warm clothing, especially at night.

The disease spontaneously declines, in a few days or weeks, leaving behind it no traces of its previous existence.

Phlyctenæ, are vesications or blisters of different sizes, resembling scalds or burns. They soon disappear, and require no special treatment.

There are a number of rashes seen during dentition, which it is not necessary for us to describe particularly. Scrofulous children are subject, during dentition, to the lymphatic disorders peculiar to their constitution, such as is manifested by the swelling of the cervical, inguinal, and mesenteric glands.

The treatment of these, and kindred affections, must turn upon the means of invigoration previously referred to when considering the constitutional vice upon which they depend. Proper nutriment, exercise, clothing, &c., will do all that can be expected from external agents.

SECOND DENTITION.

The cutting of the second set of teeth is commonly accomplished without inconvenience, either of a local or constitutional character, with the exception of the wisdom teeth, which being often crowded, not unfrequently occasion a great deal of suffering, such as acute local pain, inflammation of the gums and adjacent tissues, fever, violent headache, ophthalmia, &c. This suffering has often been mistaken for that accompanying other affections, such as neuralgia, intermittent fever, and rheumatism. Abscesses near the angle of the jaw may occur under these circumstances.

Of course the treatment would be to liberate the impeded tooth by a free incision, or even, under certain conditions, to extract it. The inflammation of the soft parts must be combated, if necessary, by antiphlogistic means.

THIRD DENTITION.

A number of well-authenticated cases of partial and even complete dentition, occurring in very old persons, are recorded in the books. In one instance recorded in the *Edinburgh Medical Com.*, vol. iii., the subject of this late teething suffered very severely.

The patient, in this instance, was sixty years old, and entirely toothless. At this time he experienced very severe pain in his gums and jaws, which at length amounted to excruciating torture; but at the end of twenty-one days from the beginning of his sufferings, he was compensated by the appearance of a complete new set of teeth.

With regard to the constitutional effects of this abnormal dentition, Prof. Harris, who relates two cases of this kind as having occurred under his own observation, remarks: "It would seem that the efforts made by nature for the production of a third complete set of teeth, are usually so great, that they exhaust the remaining energies of the system; for occurrences of this kind are generally soon followed by death."

CHAPTER XVII.

EFFECTS OF DISEASED TEETH AND GUMS UPON ADJACENT PARTS
AND THE GENERAL SYSTEM.

THAT diseased conditions of the teeth and the structures adjacent to them, do exert a most pernicious influence upon the general health, is a fact as well established as any other medical observation; yet the medical profession are, apparently with very few exceptions, entirely unaware of it.

I am not apprised that the subject is ever alluded to by lecturers on the practice of physic, when recapitulating to their classes the causes of functional disturbance and constitutional suffering; it is not noticed in the many text-books on practice; and, certainly, however frequently the physician may look into the mouths of his patients, it is very rarely that his comprehensive glance perceives anything worthy of note in the decaying organs of mastication.

It is full time that practitioners of medicine should perceive the importance of the teeth and of their diseases; but, until they do so, it is the more important that the dentist should be able to point out the causes of obscure disease, which the physician has in vain endeavoured to discover, simply because he has sought for it everywhere but in the right place.

It might be granted, *a priori*, that if physiological conditions of the teeth, owing to their peculiar position, association, and history, may exercise powerful influence upon the health of other organs, pathological conditions of these same teeth cannot be entirely harmless.

Again, if we would examine the structure of a tooth, and perceive how completely its sensitive part is enclosed in an unyielding bony case, we might readily infer from the conse-

quences of compression in other parts, that the swollen and inflamed pulp, &c., would be exceedingly painful. If, too, we would regard the close connexion existing between the teeth, the rapidity with which the flash of sympathetic pain darts along the nervous cords that vitalize them, and the intolerable and protracted suffering which ensues, upon even trifling irritation of these sensitive filaments, and remember that pain itself is fully capable of deranging the whole economy, and inducing serious and fatal disorder, we might, without the aid of much reflection, adopt the very rational conclusion that the diseases of the teeth must be of considerable consequence to the entire organization. We might, also, with similar propriety, conclude that the teeth were not made merely for ornament, and that mastication and insalivation are something more than mere forms of introduction to the stomach; that they are important to digestion, which is important to the entireness of organs and the performance of function, and that if mastication, and the insalivation accompanying it, be imperfectly performed, some corresponding imperfection of digestion must result. We might also infer, from the known consequences of long-continued morbid influences, however unimportant in their immediate action, that disturbance of digestion, constantly repeated, must, in time, develop evils of a serious character.

The old pathological maxim, "*ubi irritatio ibi fluxus*,"* is fraught with a valuable lesson to the medical practitioner. It is true that the nervous, and to a certain degree, even the vascular forces hurry to the part which throws out the signal of distress, and all the floating energies of the system are directed to the relief of the suffering. If it can be readily accomplished, the equilibrium of the body is soon restored, and no perceptible inconvenience results. But if from the impracticable nature of the tissue or organ affected, but little relief can be given, and if the efforts of nature to accomplish cure or removal of the part, end only in accumulating about it an uncommon amount of sensibility, increasing the irritation and demanding

* "*Where there is irritation, to that part will be the flow.*"

yet more of constitutional effort to combat it, the consequence must be such a diversion of nervous influences from other parts as to weaken their force of action, and to embarrass their functions.

In short, it is easy to understand that when the first movement towards constitutional derangement has been made, if the cause continue to act, each accession of morbid condition must aggravate and extend the evil, and hence it is that causes in themselves very slight may, if long continued, from the influence of sympathy and the accident of relations, induce morbid conditions of the most serious character.

The remarks of Mr. Koecker upon this point are so sensible and so well expressed, that no apology will be necessary for introducing them here at some length.

Mr. Koecker observes that, "to form a more distinct conception of the very powerful morbid influence which the diseases of the teeth and their contiguous parts must unavoidably produce upon the general constitution, it is necessary to consider the peculiarity of the structure and functions of these parts.

"The extremely hard and dense structure of the bony parts of the teeth, and the great arterial activity and nervous irritability of their lining membranes, which can so powerfully, and for so long a time, defend the teeth against general local and morbid influences, are also causes of their producing very extensive morbid effects upon the whole system. The functions of the teeth as well as of the gums, when in a healthy state, act as powerful stimuli towards their preservation, but when these parts are diseased or affected with disorder of any kind, they become constant causes of irritation upon them as well as upon the general health. The bony structure of the teeth, however, having in itself but little self-restoring power, and their peculiar functions being much less favourable to this natural process than those of any other part of the body, and the teeth and their gums, periosteal and sockets, being altogether dependent upon each other, this power is much more constantly and in a much higher degree required, and seems to be much

more exerted by these than by any other structures; and the more these powerful efforts are incapable of curing the dental diseases, and resisted in their efforts to remove their causes, the more active is the constitution in its attempts to resist the progress of such diseases, whilst at the same time a considerable portion of general health and strength is consumed in the struggle.

“ Diseases in the bony structure, and indeed of the teeth and gums generally, when yet in their incipient stage and without being influenced by any other causes than the local disorder itself, produce no greater constitutional effects than other local maladies; but with this difference, that their self-curative action is exerted in a proportion corresponding to the peculiar structure, functions, and relations of these parts, and therefore comparatively much greater and longer continued than that produced by diseases of other parts or bones. In this state they proceed very slowly, and their morbid effects can only be detected by the most minute attention.

“ The general system, however, in the mean time being often disturbed, the caries will be found to proceed much faster towards the cavity of the teeth, and the inflammation of the gums to increase. In that event, any constitutional disorder is competent to aggravate the local one, whilst the latter, also, in its turn, greatly excites and augments the former. At this period it may be still taken as a general rule, that the morbid influences of general disease upon the dental maladies are more powerful than those of the teeth upon the general system.

“ The teeth having been deprived of their vitality by the destruction of their lining membranes, are not only rendered useless, but are converted into lifeless incumbrances upon the system, which produce, by their mechanical and chemical irritation, an action similar to that effected by gangrene or mortification in other bones, by means of which, nature attempts to throw off the dead part.

“ The parts surrounding such dead teeth, viz. : gums, periosteum, sockets and maxillary bones, are thus involved in serious disease, inflammation gradually extends over the whole of these

parts, and a strong effort appears to be made to effect the expulsion of the decayed teeth, now become dead and offending bodies. But although nature might succeed in thus removing almost any other soft or hard part of the body of equal dimensions, in a few weeks or months, a space of from five to ten years, and sometimes a much longer period is required for the removal, by the same natural power, of a dead tooth.

“As long as the primary diseases are principally confined to the teeth themselves, and in these instances where they are the proximate local causes of diseases of the mouth without supposing the existence of many dead stumps of teeth, so long may we look for those acute symptoms and effects which have been stated, and see them change alternately from one form of disease into another, but after that period, or when the local maladies having originally commenced in the gums, periosteal, alveoli, and maxillary bones, shall have extended to a certain degree, a total transition into a permanent chronic state of the disease takes place.

“In such a state of disease nature seems exclusively and actively engaged by producing inflammation and suppuration in extricating the mouth from all the morbid causes affecting the diseased parts, such as dead roots and stumps, tartar, and teeth which are loose or irregularly situated. The sanative power of nature being, however, very rarely competent to effect such a cure, the various diseases of the gums, periosteal, alveoli, and maxillary bones are exasperated, and for the most part terminate in a state of suppuration and mortification.”*

When the chronic condition here described has been fairly reached in the progress of disease, the sensibility of the parts is much diminished; the gums and periosteal are thickened and callous, and the continual discharge sufficiently depletes the vessels, to relieve them of the suffering incident to inflammatory engorgement. All resistance to devastation of the dental arch seems to cease, and the parts are abandoned to rapid destruction. In the mean time the patient congratulates himself

* Koecker, Princ. Dental Surgery.

that his teeth have ceased to ache, and consequently gives himself no trouble about them. Inflammation, suppuration and caries now spread along the dental arch until every tooth is broken down and every root has become a permanent irritant, provoking a constant purulent discharge from the soft parts about it.

The food is no longer chewed, and everything which passes through the mouth is mixed with a vitiated compound of saliva, mucus, pus, and blood, which descends to the stomach to mingle with the gastric juice, and deteriorate the quality of that most important fluid.

The absorbents, too, are constantly at work, and the dissolved fragments of carious bone, &c., are continually thrown into the current of the blood.

The alveoli cannot escape the general ruin. Involved in the all-pervading inflammation, they also suppurate and break down, and not unfrequently the maxillary bones and the antrum are also involved in disease.

Dyspeptic symptoms, marasmus, cough and other pectoral symptoms, violent neuralgic affections of the face, great nervous depression, hysterics and hypochondriasis, may be expected to attend such conditions of the teeth.

The dyspepsia is easily accounted for. In the first place, the food is badly prepared for the stomach; 2d, the fluids of the mouth, constantly trickling into the stomach, impair its tone and vitiate its solvent secretion; and 3d, the continual demand made upon the system by the vain efforts which nature makes to cure the diseases of the teeth, and also by the frequent and severe pain, diminishes the nervous influence which the stomach receives, and impairs its powers.

Every one is aware that when the stomach is full, there takes place in that organ such a concentration of nervous energy as is sensibly felt by its loss in other parts of the body. Hence the drowsiness and the indisposition to mental and physical effort experienced after a hearty meal.

It is also well known that anything which attracts from the

stomach this accumulated nervous power, impairs appetite and digestion.

Extraordinary emotions, powerful intellectual efforts, venereal excesses, &c., all act in this way upon the digestive apparatus. Pain, also, wherever located, produces a similar effect, and the impairment from this cause will be important in proportion to the frequency and continuance of the suffering.

In these several facts we have sufficient reasons for the indigestion which so frequently attends extensive diseases of the teeth.

Marasmus, or gradual emaciation, is but a consequence of the insufficient nutrition attending dyspepsia.

Cough and other pectoral symptoms, may result as the consequence of any prolonged irritation, especially if digestion be impaired. The mucous membrane of the larynx, trachea, and lungs sympathizing with similar structures, and participating in the common defect of nutrition.

Neuralgic affections of the face, head, and neck, are occasioned by the continual irritation of the extremities of the dental nerve, and the propagation of it to the trunk and branches of the great fifth pair, or trifacial nerve.

Depression of spirits, hysterics, and hypochondriasis, result from continual nervous irritation, and the debility of nerve which results from long-continued over-action. Indigestion also is a powerful cause of the melancholy or hysterical condition so often observed in these cases.

Epilepsy, and other affections not enumerated above, sometimes occur as the result of dental irritation, as will be shown by the following cases narrated by Dr. Rush (*Med. Repos.* vol. vi. 285.)

CASE 1. "Some time in the month of October, 1801," says Dr. Rush, "I attended Miss O. C. with a rheumatism in her hip joint, which yielded for a while to the several remedies for that disease. In the month of November it returned with great violence, accompanied with a severe toothache. Suspecting the rheumatic affection was excited by the pain in her tooth, I directed it to be extracted. The rheumatism imme-

diately left her hip, and she recovered in a few days. She has continued ever since to be free from it.

“Soon after this I was consulted by Mrs. T. R., who had been affected for several weeks with dyspepsia and toothache. Her tooth, though no mark of decay appeared in it, was drawn, by my advice. The next day she was relieved from her distressing stomach complaints, and has continued ever since to enjoy good health. From the soundness of the external part of the tooth, and the adjoining gums, there was no reason to suspect a discharge of matter from it had produced the disease in the stomach.” (Doubtless it was due to the irritation, and the consequent deviation of nervous influence to the suffering parts.)

CASE 2. (Dr. Rush.) “Some time in the year 1801, I was consulted by the father of a young gentleman in Baltimore, who had been affected with epilepsy. I inquired into the state of his teeth [an inquiry which is even yet very unusual in such cases, but which serves to show the superiority of Dr. R. in judgment and comprehensiveness of thought], and was informed that several of them in his upper jaw were very much decayed. I directed them to be extracted, and advised him afterwards to lose a few ounces of blood at any time when he felt the premonitory symptoms of a recurrence of his fits. He followed my advice; in consequence of which I had lately the pleasure of hearing from his brother that he was perfectly cured.”

In commenting upon these cases, Dr. Rush remarks:

“I have been made happy by discovering that I have only added to the observations of other physicians in pointing out a connexion between the extraction of decayed and diseased teeth, and the cure of general disease. Several cases of the efficiency of that remedy in relieving headache and vertigo, are mentioned by Dr. Darwin. Dr. Gater relates that M. Petit, a celebrated French surgeon, had often cured intermittent fevers, which had resisted the bark for months and even years, by this prescription.” (These cases must have been merely irritative fever, appearing, as it generally does, with exacerbations depending upon constantly recurring circumstances, such as the stimulus of light, food, exercise, &c. They were not true in-

termittents.) He also quotes from the work of Petit, two cases; the one of consumption (apparently), the other of vertigo, both of long continuance, which were suddenly cured by the extraction of two decayed teeth in the former, and of two supernumerary teeth in the latter case.

“In the second number of a late work, entitled ‘Bibliothèque Germanique Médico-Chirurgicale,’ there is an account, by Dr. Seibold, of a young woman who had been affected for several months with great inflammation, pain, and ulcers in her right upper and lower jaws, at the usual time of the appearance of the catamenia, which were always deficient in quantity. Upon inspecting the seats of these morbid affections, the doctor discovered several of the molars in both jaws to be decayed. He directed them to be drawn, in consequence of which the woman was relieved of the monthly disease in her mouth, and afterwards had a regular discharge of her catamenia.

“These facts,” continues Dr. Rush, “though but little attended to, should not surprise us, when we recollect how often the most distressing general diseases are brought on by very inconsiderable inlets of morbid excitement into the system. A small tumour concealed in the fleshy part of the leg, has been known to bring on epilepsy. A trifling wound with a splinter, or a nail, even after it has healed, has often induced a fatal tetanus. Worms in the bowels have produced internal dropsy of the brain, and a stone in the kidney has excited the most violent commotions in every part of the system. Many hundred facts of a similar nature are to be met with in the records of medicine.*

* I met with a remarkable case of this kind a year ago. A wagoner, between 40 and 50 years of age, a very athletic man, had been engaged on the day previous in lifting some logs of wood, and perceived a little blood upon his finger, though no wound could be seen. Early the next morning he drove his team to the city, nine miles distant. On the road he suffered with intense pain in the finger, and when he reached the city, he was chilly, pale, and evidently labouring under great constitutional irritation. The finger showed no wound. The pain increasing, he with considerable difficulty reached home. Erysipelas appeared, and he died in a few days.

The season of the year, being winter, precludes the possibility of his having been bitten by a serpent. He was not intemperate in his habits.

“When we consider how often the teeth, when decayed, are exposed to irritation from hot and cold drinks and aliments, from pressure, by mortification, and from the cold air, and how intimate the connexion of the mouth is with the whole system, I am disposed to believe they are often unsuspected causes of general, and particularly of nervous, diseases. When we add to the list of these diseases the morbid effects of the acrid and putrid matters which are sometimes discharged from carious teeth, or from ulcers in the gums, created by them; also the influence which both have in preventing perfect mastication, and the connexion of that animal function with good health, I cannot help thinking that our success in the treatment of all chronic diseases would be very much promoted by directing our inquiries into the state of the teeth in sick people, and by advising their extraction in every case in which they are decayed. It is not necessary that they should be attended with pain, in order to produce disease; for splinters, tumours, and other irritants before mentioned, often bring on disease and death, when they give no pain, and are unsuspected as causes of them. This translation of sensation and motion to parts remote from the place where impressions are made, appears in many instances, and seems to depend upon an original law of the animal economy.”

Tissot, who wrote nearly a century ago, had become aware, from observation, of the great importance of diseases of the teeth to the general health. He describes toothache as resulting from gout and rheumatism, as connected with disordered stomach, and as the result of the presence of noxious matters in the blood, which, according to the pathology of his day, was the mode of expressing what we mean by constitutional vices or disorders. He also mentions intermittent toothache, which he cured with Peruvian bark; and neuralgic toothache, which was arrested by generous diet and wine.

Modern medicine, or rather, medical writers, have retrograded in some respects, however much they may congratulate themselves upon their progress in others. Microscopic somatology but poorly compensates for that close observation of

living disease, upon which our fathers deservedly laid so much stress.

In the Dublin Medical Free Press, I find the following case recorded:—

CASE 3. *Painful affection of the eye cured by extracting a tooth.*—Dr. Emmeuch relates a case of this kind. A man consulted him on account of a painful affection of one of his eyes, which had lasted fourteen years, and occasioned great suffering. There was considerable vascularity of the conjunctiva and sclerotica, especially around the cornea, which structure itself was somewhat opaque and spotted. There was a continual flow of tears, with pain, and intolerance of light. All these symptoms were greatly aggravated by any indiscretion in diet and the use of the slightest stimulus, such as a single glass of wine. All kinds of remedies had been tried in vain, at different times, and the affection seemed incurable. On examination of the upper jaw, Dr. E. found a carious tooth in the side corresponding to that of the affected eye. The portion of the jaw around the tooth was painful, and very sensitive to the touch. The patient thought the affection of the tooth had begun simultaneously with that of the eye. The tooth was drawn, and almost immediately afterwards the symptoms relating to the eye began to subside, and soon entirely disappeared. The affection of the eye was evidently the result of sympathy between the second and third branches of the fifth pair of nerves.

Dr. Rush (Med. Inq. and Observations on the Diseases of the Mind, p. 33,) observes that “Irritation, from certain foreign matters retained in irritable parts of the body, is among the causes of insanity.” He adds, “I once knew some small shot which were lodged in the foot of a schoolboy, induce madness, several years after he became a man. It (insanity) has been brought on, in one instance, by decayed teeth, which were not accompanied with pain.”

Mr. Koecker has published a number of cases, forcibly illustrating the effect of diseases of the teeth upon the general health. From these I select the following:—

CASE 4. "Mrs. P., a lady of great respectability, under the medical care of Dr. Jule Rucco, of Leicester Square, had, some years since, continually suffered from dyspepsia, as well as from various kinds of nervous attacks of a very annoying and alarming nature. This judicious physician had for a long time suspected the cause, and frequently proposed to consult me. By the wish of the lady, however, the dentist of the family was at last sent for, and three or four teeth and roots were removed, which, according to the assertion of the dental attendant, were all that could be extracted. The disease, however, was only aggravated by this interference, and the sufferings of the patient increased more and more.

"About six months after, the doctor again urged a meeting with me on the subject, and at last I was sent for. I found the lady labouring under a complete salivation, from an extraordinary sympathy of all the glands in any way connected with the teeth. On the previous night, and, indeed, for many nights preceding, she had been suffering such violent fits of convulsion as to alarm the whole family. The face was affected with an acute erysipelatous inflammation, accompanied with headache, as also with considerable derangement of the digestive functions, such as sickness, vomiting, loss of appetite, &c. By examining the mouth, I found that the previous dental treatment had been very partial, and I proposed the removal of every tooth and root which produced irritation.

"The lady consented immediately to my proposal, and the necessary operations were performed on the 8th of October, 1824, when nine decayed teeth, some of them mere roots, were extracted. The patient was requested to rinse her mouth frequently with a diluted astringent lotion. By this simple local treatment, and by the further medical care of Dr. Rucco, she was perfectly cured in about a week after the operation.

"Very soon after her recovery, the lady was enabled to fulfil a promise of marriage which for some time had been prevented by her protracted and distressing disease. Since that period, she has enjoyed perfectly good health.

"The farther treatment of the case has, however, been de-

layed, on the accomplishment of which, of course, the permanency of the cure will depend."

CASE 5. A literary gentleman in the neighbourhood of London had been for some years under the medical care of Mr. J. Derbyshire, of Greek Street, Soho, on account of a constant state of derangement of his digestion.

Much sedentary occupation, and some excessive grief, had of late greatly augmented the distressing symptoms generally accompanying this cruel disorder. His disease had assumed the character of hypochondriasis. His spirits were so dejected, and the state of his bodily health was so low, that he was no longer capable of attending to his ordinary business.

Having had some conversations with Mr. Derbyshire on the influence of disease of the teeth upon the general health, that gentleman was induced, at his next visit, to inquire into the state of his patient's teeth, and learning that they were in a very deplorable condition, he proposed a consultation with me on the subject. After a particular examination, I found every tooth in the patient's mouth more or less carious, or dead, and all the gums and sockets in a very diseased state.

On the 27th of May, 1824, twenty-one teeth and roots were extracted, all of which were more or less in a state of putrefaction—three large grinders only excepted, which were either suffering from complicated caries, or producing morbid irritation upon the other parts, from some other causes.

The mouth was restored to perfect health in the course of about six weeks. During the progress of treatment of the diseases of the mouth, the general health improved very surprisingly; and after the restoration of perfect health to all the remaining teeth, and their relative parts, the patient enjoyed uninterrupted good health, and returned to his ordinary professional avocations.

CASE 6. The following is a letter which was handed to me (Mr. Koecker) by Miss B., Manchester Street, London, in the beginning of the month of May, 1825. The history it gives is, perhaps, one of the most distressing cases of its kind, concerning a lady of great respectability and rank in Scotland, of

about thirty-eight years of age. Its contents, indeed, are not less remarkable for the manner in which they display the uncommon fortitude of the unhappy sufferer, than for the striking confirmation which they give of the facts which I have detailed, as well as the description I have given, respecting the present state of dental surgery. Considering this evidence as most useful and important, I beg to submit to the reader the whole of the fair sufferer's most interesting and affecting communication.

“MY DEAR —, I have been so ill since I wrote you last, that I have not been able to answer your kind letter. As I can express myself to you easier than to a stranger, I shall endeavour to give you some idea of my present state, and you can give my letter to Mr. Koecker. Constant faint gnawing pains in my gums, membrane of my mouth and cheeks, accompanied with considerable swelling of the latter, which are always blotched, inflamed, and irritated, just in the way some people's faces are affected when suffering toothache; my very nose is swelled and inflamed, and the muscles of the under part of my face so contracted and drawn upwards, that I cannot swallow anything but liquids. My mouth is contracted and full of slimy saliva. In bed I have constant twitches in my gums, like what I could figure electricity. Sometimes my gums and face burn like fire, and sometimes feel as if every nerve and blood-vessel were filled with ice, and the sheets near my mouth are wet with saliva. All these sensations often run down behind my ears, to my neck and arms; and at these times I have a great hurry and agitation of spirits, and aching across the breast and heart. To me, one of my greatest tortures is the extraordinary inflation of gums, particularly towards the roof of my mouth. They feel as if they absolutely tore from the bone, hove up, as it were, with the wind, and my jaws feel twice too large for my mouth, the pressure against my face is such. The same sensation often proceeds to my cheek bones, which increases the swelling of the muscles and the dragging up of the under jaw.

“I must now go back in my history, that Mr. Koecker may know the progress of the last five years of my continued misery. But, unluckily, I fear it is impossible to make any one understand my sufferings, they are so various and complicated. You know I always blamed my teeth as the cause of all my sufferings; but I am now convinced that the disease is in my gums and remains of the alveolar processes; and as I was told that was a part of his profession Mr. Koecker was supposed to be very skilful in, it makes me very anxious to have his opinion. You will remember how long (many months) the sockets of my large molar teeth stood open, and even when they did heal up, the gums were full of morbid sensibility. When I last saw you, I had only about five front teeth remaining, and eight below. About 1818 they began to ache a little, and, as usual, to irritate and inflame my cheeks. The five upper ones began to spoil; but I fought on with them until the winter of 1819, when the inflammation, and the various sensations I have mentioned before as now suffering, increasing, and the teeth themselves aching, I had them pulled. The gums swelled and inflamed most dreadfully, the horrid sensations in the roof of my mouth increased, and my face was as bad as ever. In about a month the wounds healed, but the gums remained swelled and became a hard white gristle. After suffering for many months, I had the gums opened. They were so hard and thick, the dentist said they were like bone. The sockets were not the least absorbed; of course, rough, and in some parts exfoliated.

“The gums were kept open near a month, and caustic applied to excite absorption. In the course of this process the point of a tooth was discovered in one of the sockets, and extracted. It was a full-grown eye-tooth, which, for want of room, had never made its way down. I was easier as long as the gums were open; but just where I was, when they healed up and resumed their state.

“Some months after this, my under jaw became affected; the teeth were not spoiled, but became so painful to the touch, that I could bear nothing in my mouth to touch them. My

lips became very tremulous, and my hands trembled so that I could neither feed nor dress myself. When warm in bed they ceased; but from the moment I rose and began to speak, or let the air into my mouth, I never ceased trembling, and the dry retchings (which you remember how tortured I used to be with) increased so as to bring on vomiting. I suffered in this way for eleven weeks, when, in despair, I had all my remaining teeth pulled. The tremblings and retchings quickly abated, and in a few weeks completely left me, and I have never had them since. My under gums, even before the teeth were pulled, were a hard gristle, and almost as white as the teeth. My gums have been often opened to give me relief, but as nothing will induce them to suppurate, I get no advantage, the wounding only increasing the hardness.

“These gums seem to me to act as levers, pressing on the nerves and blood-vessels, and keeping up a constant irritation and inflammation in my mouth and face.

“Under an idea that my complaint proceeded from neuralgia, I was advised to have the mental nerves divided at the chin, which did no good, and has created such hard tumours on these places, that I think their pressure on the side of the jaw is the cause of the twitching pain of my under lip, and the contraction of the muscles.

“I would take it as a great favour if Mr. Koecker would say whether he thinks he could be of any use to me here, until I am able (which, alas! I fear I am not) to come to London; or if he could give me any advice which I might desire to be done here; and if he will be so very good as to mention what are the different kinds of diseases he has ever met with in the gums or alveolar processes, and his mode of treatment. There seems to be an idea here that if the sockets are not carious, there can be no disease there; but I think Fox mentions otherwise.

“My upper gums had not been touched for four years, until a week ago, when a part was opened that was very troublesome, and much swelled. The bone was full of points and inequalities, and rough; sounding gritty, like sand. There

was a great deal of thick slime, like the white of egg, mixed with blood. Some nitrous acid was put upon the wound, to try to keep it open a little, but in vain. It is already covered with a new gum, and the old thick parts gaping open. I am sure if these old swelled gums could be got away, I should suffer less.

"I should think there is about the eighth of an inch of the socket remaining. The ridge of the under jaw is as sharp as a knife, and so painful to the touch, when I press it, that it makes my face, ears, and neck burn. My lips are painful, and are drawn in. I was advised to try false teeth, but they increased my sufferings ten-fold, which is very hard, as the clinching of my jaws adds much to my sufferings. My eyes are beginning to be much affected, which must plead my apology to Mr. Koecker for this sad scrawl, which I think you will need to help him to decipher.

"There are various opinions about my complaint. One says it is a nervous complaint at the origin of the nerves, affecting the extremities of these nerves; others say it is a nervous affection of the dental nerves and their ramifications on the face; and others are of opinion it is an affection of the covering of the bone. I am satisfied it is some disease of the antrum. Could it injure me to have the antrum opened to ease my mind? There is one place where I think there is part of a fang of a tooth, which I am certain was broken, as the dentist burnt the tooth without letting me see it; perhaps that may torment me."

Mr. Koecker gives no opinion upon this case; but the lady seems to me to have had more discernment than her professional advisers. The disease was probably seated in the antrum, and very likely the fragment of fang was the irritating cause.

The following cases are reported by Dr. C. A. Harris:—

CASE 7. "In September, 1830, I was consulted by Mr. —, at that time a resident of New York. Before I examined his teeth, he informed me that his general health had been

very bad for four or five years past, and that he had applied to some of the most eminent physicians of New York, Troy, and Albany, but had not obtained any permanent relief from his sufferings.

“The character of the symptoms that prevailed at this time was very peculiar. His digestive organs were so much deranged, that he was obliged to observe the strictest regimen, and confine himself to the simplest kind of vegetable food. Besides the dyspeptic affection with which he was troubled, he had severe paroxysms of headache and vomiting, that recurred at regular intervals of from four to five weeks. These were always preceded by numbness, which commenced in his tongue and extended thence throughout the whole system. This sensation continued usually for about two hours, when it was succeeded by a violent pain in the head and partial vertigo, from which, in about ten hours, he was relieved by vomiting. The effects of these paroxysms lasted about ten days, and the other symptoms had continued, without much mitigation, for three years.

“On examining his mouth, I gave it as my opinion that the diseased state of his teeth was the cause of his affliction. This idea, though entirely novel to him, he was disposed to believe correct, and therefore readily consented to the treatment I prescribed. Many of his teeth were much decayed, and nearly all of them covered with tartar. The roots of some were denuded of the gums, the alveolar processes more or less absorbed, the gums turgid, fungoid, bleeding on the slightest touch, and of a dark red colour. The secretions of the mouth were viscid, and their exhalations exceedingly offensive.

“Such of his teeth as could not be perfectly restored were extracted, and as much tartar was taken away as could be conveniently removed at one time, and the rest at subsequent sittings. His gums were freely scarified, and a tonic astringent and detergent wash was directed to be used three or four times every day. Under this treatment the local affection of the mouth rapidly disappeared, and in about four or five weeks his teeth and gums became perfectly healthy. His general health

also began to improve, and in about two months it was perfectly restored, and has so continued."

CASE 8, *communicated by Dr. Harris*. "In February, 1851, W. S., of Virginia, aged about 45, called on me for advice in relation to a tumour in the roof of his mouth, which had been first perceived fifteen months previously, during which time there had been an occasional dripping of purulent matter behind the velum palati. On inquiring into the history of the case, I learned, that about two or three weeks previous to the occurrence of the tumour, he had an attack of toothache. The pain was felt in the first right superior molar, but had subsided before the formation of the tumour, leaving the tooth somewhat sensitive and sore to the touch and slightly elongated. As it caused him but little inconvenience, having some years before lost the tooth in the lower jaw with which the diseased upper molar antagonized, it was not suspected to have any connexion with the disease of the palate, although the swelling had frequently extended down the side of the alveolar border opposite the palatine root.

"Having ascertained these facts, I had but little difficulty in tracing the origin of the disease to the alveolus of the palatine root of the tooth in question : the tooth being necrosed.

"The extraction of the tooth confirmed the correctness of my suspicions. In three days the tumour of the palate disappeared, and the trickling of pus ceased."

It might be curious to inquire, what would have been the opinion given of this case, and the treatment pursued, by some able surgeons to whom the effects of diseased teeth upon the adjacent structures had never been a subject of inquiry or observation. As the tooth did not ache, and had not ached for some time before the appearance of the tumour, it probably would have never been suspected of any agency in the matter. Had its necrosed and elongated condition been observed, it would naturally have been attributed to the pressure of the tumour upon the alveolus. The probabilities are very small, that any but a dentist or a surgeon more than commonly attentive to the teeth, would have perceived the patient's condition, or relieved

it. Very probably he would have been subjected to painful and worse than useless attempts at cure, until the disease, so simple and so manageable, might have become far more serious and intractable. As a general rule, in all local inflammations, tumours, &c., of the parts adjacent to the teeth, the latter are to be suspected as the cause; and, until thorough observation and careful consideration have determined the contrary, we should not look elsewhere for the origin of the evil. Probably, in nine cases out of ten, our first suspicions will prove to be correct.

Dr. S——, a distinguished surgeon and physician of Virginia, reports the two cases following:

CASE 9. "Mrs. S——, a lady of thirty or thirty-five years of age, with several children, in easy circumstances, rather delicate and of sedentary habits, complained of derangement in the functions of the digestive organs, with much nervous disorder, and a painful sensation about the head, as if there were a pound weight on the top of it, with an occasional tightening of the scalp. This last sensation, she compared to that which might be expected from having the scalp forcibly drawn together on the vertex by the clawing of some animal with talons, as a hawk. Her friends, at first, thought but little of her complaints, and from their eccentricity were inclined to believe them, for the most part, imaginary. The affection of the head, however, and the sensitiveness of the nervous system, evidently increased, until they became so harassing and acute, that they deprived her of rest, and made manifest inroads upon her healthful appearance.

"Medical advice having been now obtained, a regular and carefully-directed course of purgatives was prescribed, but with little or no advantage. The cathartics having been discontinued, the Rub. Ferri, Bark, Valerian, Mineral Acids, Zinc, Assafoetida, &c., were next tried, to which were added frictions and tepid salt baths, but still without any material amendment.

"She now began to have evident exacerbations of fever towards evening, which passed off with copious and debilitating sweats, that much reduced her, and caused her countenance to

assume a sickly aspect. She visited the watering-places in Virginia, but though her strength was somewhat recruited, the distressing symptoms, with some slight modifications, still continued. She was occasionally confined to the house, but generally was able to take some slight exercise in the open air.

“This state of things had continued for eighteen months, when the attention of her physician was called to an abscess formed near the root of one of her incisor teeth. This brought about an inquiry into the general state of the teeth, of which the following is the result :

“Mrs. S——, at an early period had bad teeth, which, since her marriage, had been gradually growing worse. A few years before the time of which I speak, two of the incisors of the upper jaw were clipped off close to the sockets, and artificial teeth were inserted on the fangs. Much pain, irritation, and swelling of the gums and lips followed the operation, and similar symptoms occasionally occurred for a year or two afterwards, and were frequently attended with alveolar abscesses. The remaining incisors of the upper jaw, and several of the inferior and superior molar teeth, were found to be in a dilapidated state. The alveolar processes of several of the inferior molars were partially destroyed, and one or two of their roots were turned on one side, and clung to the alveoli by the remaining integuments.

“The situation of the mouth rendered it quite probable that the ill health of the patient arose from the irritation produced by the bad state of her teeth ; the more so, as her nervous system was exceedingly sensitive. She was persuaded to have the carious incisors and the worst of the molars removed ; and, a short time after this was done, her health began to improve. The affection of the head and scalp soon ceased, the nervous symptoms vanished, and she is now in good health, and has a set of teeth decidedly more ornamental than those given her by nature ever were. The speedy restoration of her health after the removal of her diseased teeth, justifies the conclusion that her bad health depended on the bad state in which these organs were found.”

The following case, related by the same gentleman, is particularly worthy of attention, as showing the terrible consequences which may result from ignorance of the effects which disease of the teeth, or even of a single tooth, is capable of producing in subjects of certain constitutions:

CASE 10. "Miss W——, a maiden lady of about fifty years of age, in comfortable circumstances, and for the most part sedentary of habit, had suffered much from pain in the right cheek. For some time it was not considered of much moment, but, on its continuance, a physician was consulted.

"He found but a single tooth, one of the second molars, in the superior maxillary of the affected side, and that was in a semi-decayed state. The gums above the teeth, and for half an inch on each side of it, were much swollen and of a livid redness. The tumour seemed spongoid and puffy to the touch, but there was neither fluctuation nor abscess. The patient's health had not sensibly deteriorated. She said the tumour on the gums had existed for many weeks, but had not been attended with any remarkable pain, until the occurrence of that of which she complained. She described it as being deep in the cheek, and generally dull, but now and then, for an instant, sharp and lancinating. She said the tooth, for several years past, had been accustomed to ache occasionally, but that, notwithstanding its decayed state, it was very useful, and she had therefore declined having it extracted.

"The immediate extraction of the tooth was, however, thought advisable, and with her consent, it was effected. A week afterwards the spongy tumour of the gum continued, without any abatement of the pain in the cheek. The tumour was now laid open with a lancet. It contained no matter, but was filled with those shaggy or shreddy fungi, which are often seen to occupy tumours or diseased bones. An abscess, or some other affection of the antrum, was suspected. A perforation was therefore made in its cavity, and about a table-spoonful of very dark brown matter discharged, which gave the silver spoon into which it was received a thin coat of the blackest pigment, and, on account of its offensive smell, was almost insupportable.

There was a difficulty in reaching the disease with remedies, and it was thought advisable to enlarge the communication with the antrum. The crown of a small trephine was accordingly applied to the alveolar portion of the superior maxillary, the soft parts having been first dissected up, and a corresponding portion of the bone was removed. The end of the little finger could now be introduced into the antrum, the inner surface of which, it was easy to perceive, had, at several points, been denuded of the pituitary membrane and of the periosteum.

“The disease was now fairly exposed, and nothing could exceed the offensiveness of its fetor when not corrected by suitable dressings. The usual antiseptics and detergents were locally applied, while tonics and a generous diet were prescribed to sustain the patient’s general health, and every effort was made to substitute a healthy purulent secretion for the ill-conditioned and offensive discharge from the antrum, but without any effect.

“An irremediable necrosis seemed to have taken possession of the superior maxillary of the affected side, which soon began to come away by piecemeal. In the mean time the soft parts about it were laid waste by the phagedenic character of the ulceration, and the eye of the same side became seriously affected. The disease now progressed rapidly. The perforation of the antrum was made on the 11th of March, 1821, and on the 26th of May following, the patient was found in a perfect state of apoplexy, the disease having penetrated the basis of the cranium and seized upon the brain itself. On the 30th of the same month she expired, and was thus released, by death, from the most horrible disease that can be conceived, but which had its origin in nothing more extraordinary than a neglected carious tooth.”

PHTHISIS PULMONALIS INDUCED BY DENTAL IRRITATION.

Dr. M——, an eminent practitioner of this State, reports the following extraordinary case :

CASE 11. “In the summer of 1834, I was called to visit Mr. D. M——, who had come into this neighbourhood to obtain

the benefit of the country air, having resided in Baltimore from his earliest youth. When I saw him he was in the last stage of phthisis pulmonalis. He gave me the following history of his case:

"About eight years previous he felt a soreness and tumefaction in his gum at the posterior part of his mouth, and as he had never cut the *dentes sapientiæ*, he thought the disquietude was occasioned by the progress of one of these teeth, and in consequence gave it no attention until the soreness and inflammation had extended themselves over the whole surface of his mouth and fauces. The tooth not having protruded through the gum, he consulted his family physician, who advised immediate extraction.

"In conformity with this advice, he called on an eminent dentist of Baltimore, but the tooth not having presented itself and the cause of his suffering being doubted, the operation was deferred. His sufferings, however, having become intolerable, and the irritation having extended itself to the lungs, producing considerable uneasiness, he determined, if it were at all possible, to have the tooth removed. A few days after, he stated his determination to the dentist. The gum was freely split, and after considerable pain and difficulty, the tooth extracted. The inflammation in his mouth and fauces immediately subsided, his appetite returned, and his general health soon became as good as formerly.

"About three years subsequent to this, his mouth and fauces, under similar circumstances, and from the same cause, became very sore and painful. The inflammation soon reached the lungs, and established a confirmed phthisis pulmonalis. He died a few weeks after my first visit."

The subject of this case was doubtless the victim of tubercular disease of the lungs. The tubercles were latent until the dental irritation was propagated to them, when inflammation and softening rapidly ensued. The teeth, though they did not, strictly speaking, cause the consumption, evidently precipitated it, and perhaps anticipated the fatal development by many years. The same physician, to whom we are indebted for the

preceding case, has recorded another, in which the fatal result was more directly attributable to dental suffering. He says:

CASE 12. "My friend, Dr. L——, of Frederick, Md., was called to visit a young gentleman who laboured under violent pain of the face and inferior maxillary, with very great tumefaction of the gums. His sufferings were traced to the roots of one of his molar teeth, which had been broken in an attempt to extract it. His gums and the glands of his throat became so much enlarged, that it was impossible to remove the offending portion of the tooth. The inflammation, notwithstanding the skilful exertions of the physician, rapidly increased, high and intractable fever supervened, deglutition became totally obstructed, and, in a few days, he died."

CASE 13. A case very similar to the last, though more fortunate in its results, came within my knowledge lately. A dentist was applied to to extract a molar tooth, which he did. He told the patient that the tooth had come out entire; and dismissed him. Violent inflammation ensued, a large abscess formed, and the life of the man was brought into imminent jeopardy. His physician called in a surgeon, and both being baffled, an eminent dentist was consulted. He suspected that a fragment of the root had been left, and after great difficulty, owing to the swelling of the parts, he succeeded in extracting it, and saving the life of the patient.

Dr. Fitch, in his "System of Dental Surgery," narrates a number of cases of constitutional disease, evidently caused by the protracted irritation incident to diseased conditions of the teeth and gums, from which I select the following:—

CASE 14. "In February, 1827, Dr. Samuel Jackson called and requested me to see Mrs. R——, living in Tenth above Walnut Street, who, he said, was labouring under every symptom of confirmed phthisis pulmonalis, and also appeared to suffer greatly from a diseased state of her mouth. I, accordingly, called on Mrs. R——. The following were her symptoms: great emaciation, hectic fever, almost constant cough, nearly a total loss of voice, articulation being extremely difficult, the voice as if speaking through a trumpet. Dr. Jackson

said that in the practice of seven years in the hospital, almshouse, and private practice, he had never seen a person recover from the symptoms under which Mrs. R—— laboured.

“The following was the condition of Mrs. R——’s mouth. About two years before she had the upper wisdom-tooth of the left side plugged, and the plug was pounded in by a mallet and punch. The fangs of the tooth converged together so as to form a fang of a conical shape. In hammering in the plug the socket was much injured. A chronic inflammation took place, which passed back over the palate, half arches, and some distance down the œsophagus, also over the glottis, epiglottis, and larynx. It then travelled forwards on the right side of the under jaw, and caused to inflame and slough away all the sockets and teeth of the lower jaw but one, which was the left dens sapientiæ. When I first saw Mrs. R——, the process of inflammation, sloughing, and gangrene was at its height. Extensive exfoliations of the jaw were taking place. Dr. Jackson and myself concluded that the patient could not live more than four weeks.

“*Treatment.* I at once removed all the teeth that were loose, and whose sockets were in a state of gangrene and exfoliation. I likewise, as fast as possible, removed all the dead bone, and directed the patient to wash her mouth constantly with a strong infusion of powdered galls. In about eighteen days her mouth was perfectly well. The amendment of her general health was surprisingly rapid. In five weeks she was able to take long walks in the street, and in six months she was restored to perfect health. Nearly six years have passed away, and she still continues perfectly well.”

As a corollary to this case, Dr. Fitch very properly observes: “I think we may safely infer, although diseased teeth do not, in every instance, excite general diseases of the system and of the lungs, yet, like an insidious enemy, they are ever ready to unite with or exasperate other causes, so as finally to undermine the powers of the system. I would earnestly solicit the attention of the medical faculty in general to a critical inquiry into the state of the teeth in all cases of pul-

monary affection ; and there is hardly a doubt that their inquiries would result in the general conclusion that a diseased state of the teeth and gums does very frequently excite pulmonary affections, especially in persons predisposed to them, and always aggravates these complaints, let them be excited by whatever cause they may."

Professor Chapman, of the University of Pennsylvania, in his lectures related the following case:—

CASE 15. "Some years since a lady came from a distant part of the country to this city, in pursuit of medical aid, and placed herself under the care of Dr. Chapman. He found her labouring under every symptom of obstinate dyspepsia, by which her health and strength were greatly impaired. His correct and well-known acumen in the pathology of disease immediately led him to inquire into the state of her gums and teeth. He found her gums in a high state of inflammation, and many of her teeth loose and diseased. By the direction of Dr. Chapman she applied to one of our most respectable dentists, and had her mouth and teeth placed in a healthy condition, and with the return of health in her teeth, gums, &c., every dyspeptic symptom left her, and she became quite well.

"After some time had elapsed, and the lady's health seemed confirmed, she had a few artificial teeth placed in her mouth to supply some which she had lost, which, either from not being well adapted and properly inserted in her mouth, or from some peculiarity in the lady's constitution, proved a source of irritation, and brought on a return of the distressing dyspeptic symptoms, which compelled her to dispense entirely with the artificial teeth, when her health was again completely restored."

The celebrated Baglivi observes, that "Persons whose teeth are in an unclean and viscid state, though daily washed, have universally a weak stomach, bad digestion, and offensive breath, headache after meals, generally bad health and low spirits. If engaged in business or study they are irritable and impatient, and are often seized with dizziness. From weakness of the stomach they are naturally somnolent, scarcely wakeful in the morning, and never satisfied with sleep."

Hufeland enumerates sound teeth among the signs of long life. "For good digestion," he says, "good teeth are extremely necessary, and one, therefore, may consider them among the essential properties requisite for long life: and in two points of view—First, good and strong teeth are always a sign of a sound, strong constitution, and good juices. Those who lose their teeth early, have, in a certain measure, taken possession of the other world, with a part of their bodies. Secondly, the teeth are a great help to digestion, and, consequently, to restoration."

Mr. Liston observes:* "From the presence of carious teeth, or decayed portions of teeth, many evils, both local and general, ensue, besides inflammation and abscess. They are frequently the cause, *and the sole cause*, of violent and continued headaches; of glandular swellings in the neck, terminating in, or combined with, abscess; of enlargement and inflammation of the tonsils, either chronic or acute; of ulcerations of the tongue and lips, often assuming a malignant action from continued irritation; of painful feelings in the face, *tic-douloureux*, pains in the tongue, jaws, &c.; of disordered stomach from affection of the nerves, or from imperfect mastication; of continued constitutional irritation, which may give rise to serious diseases."

CASE 16. (Dr. Fitch.) "Mrs. S——, aged about 38 years, was sent to me, by one of our most eminent physicians, with a request that I would examine her teeth, and perform such operations upon them as I judged proper, to render them and the gums healthy. The state of this lady's health was miserable; she was harrassed by the most distressing symptoms of dyspepsia. Her digestion was very imperfect, the stomach irritated, loss of appetite, and a most melancholy depression of spirits. When she first called it was necessary for her to repose herself for some time, before she could have her mouth examined.

"Upon examining her teeth and gums, I found nearly all the former in a state of disease, and the latter were in a state of

* Liston's Surgery.

suppuration, much inflamed and swollen. A considerable deposit of tartar was formed around the necks of the teeth; in several instances their fangs were denuded of the gum by the deposit of tartar, and, in fine, her mouth was in a general state of disease. I need not detail the several operations by which her mouth and teeth were rendered healthy. Suffice it to say, that in about four weeks her mouth was perfectly well. The amendment of the general health, after the first operations were performed on her teeth, was also surprising, and would have been entirely so to any person not acquainted with the immense sympathy between the mouth, gums, &c., and the stomach.

“Within five weeks after I saw her, every vestige of disease in her digestive organs left her, and she was apparently in perfect health.”

CASE 17. *Neuralgia from diseased teeth.*—(Prof. Harris.) “The following is one of the many cases of tic-douloureux or neuralgia faciei, produced by disordered teeth, that have come under my own observation.

“The subject of it was a lady about forty years, of sedentary habits, and naturally of rather a nervous temperament. For several years she had been afflicted at times with a most distressing and painful affection of her face, which was pronounced by her physician to be tic-douloureux. The pain was sometimes so acute and lancinating that it almost deprived her of reason. It generally commenced near or a little anterior to the angle of the superior maxillary bone, thence it darted across the face to the alæ of the nose, and then to the temple, forehead, and angle of the eye, accompanied with frequent and sudden transitions from one side to the other, twitching and tremors of the muscles of the affected parts, and with a preternatural flow of saliva. Her face, and sometimes the whole of her head, were rendered so sore by these paroxysms, that the slightest touch would produce pain.

“These paroxysms, although they were generally of short duration, frequently recurred as often as ten or fifteen times in twenty-four hours, and sometimes lasted ten, sixteen, and even

twenty days, after which they would gradually subside, having subjected her during their continuance to the greatest misery, and leaving after their subsidence a dull, heavy pain in one or both jaws. A sensation similar to this was always (especially in the right side of the upper jaw) experienced several days before one of these attacks, which often enabled her physician to ward them off, and finally led to the detection of their cause. These spasms were more severe and occurred more frequently in cold, damp, and wet than in warm and dry weather.

“Bark, quinine, carb. ferri, stramonium, belladonna, and various other tonics and antispasmodics were prescribed, but without any apparent beneficial effect. Leeching, sinapisms, and epispastics were also of no avail. As a last resort, it was determined to divide the affected nerve; but before the operation the physician was induced by the pain in the jaws, always preceding these paroxysms, to examine the condition of the patient's teeth. The examination showed them to be in a very unhealthy state. The molares generally, and especially those on the right side, were involved in complicated caries. The gums were much tumefied and inflamed, and very sensitive.

“Her teeth and gums, from the diseased condition in which they were found, were immediately supposed to have some agency in producing the affection of the face. A consultation with me was therefore proposed, and I was requested to visit her.

“On examining her teeth, I found that eleven were so much decayed as to render their restoration impracticable. It was therefore determined to remove them immediately, but it was not thought proper, owing to her extreme debility and the state of her nervous system, that more than two or three should be extracted at one time.

“So great was her agitation at the mere thought of the operation, that notwithstanding the agony she suffered, she could not, on my first visit, be persuaded to have even a single tooth extracted, but requested me to call on the next day, when she

promised she would submit to the removal of as many as she possibly could.

"I accordingly called on the following day, and to the astonishment of her friends, she allowed all her jaw teeth that were carious, eleven in number, to be at once extracted. The operation at once revealed the cause of her disease. The roots of three of these teeth were very much enlarged by bony depositions. One of the fangs, was, at its extremity, about the size of a pea. Those of the other two were not quite so large, but a disposition to exostosis was manifested by all. With the removal of these teeth, all symptoms of pain entirely vanished, nor have they, to my knowledge, returned since."

CASE 18. *Death caused by the extraction of a tooth.*—(Jourdain.) "A citizen having submitted to the extraction of a tooth, the gums became gangrenous; the gangrene reached the brain and caused death." The same author reports a case of

CASE 19. "*Convulsions and death caused by the shortening of a tooth longer than the others.* A nun of Padua having had a tooth shortened in order to get rid of the deformity, died immediately in an epileptic convulsion. A small fragment of nerve was discovered in the section of the tooth."

This case and others, which fortunately have not terminated so seriously, should be a warning to all operators upon the teeth, not to inflict *sudden and violent pangs*. Experience shows us that a great amount of pain can be endured, if slowly and gradually inflicted, while instinct teaches us all to dread sudden pangs, even of more moderate intensity. Even in extracting a tooth, it is better to operate gradually rather than wrench it out with a sudden and violent effort. If pain be gradually inflicted, the nervous system, conscious of the coming trial, summons up all its powers of endurance; but when taken by surprise, the shock is severely felt and the consequences may even be fatal, as in the case just quoted.

Pain is a great evil. It should never be inflicted unnecessarily, and when necessity occurs, the inflictor should use all possible means to render the suffering as tolerable as possible. Moreover, there is great difference in individuals as to the

tolerance of pain; even as to the perception of it. Many persons will suffer terribly from operations which would not cause serious pain to others. The same persons will suffer much more at one time than another. All these considerations are well worthy the attention of the dentist.

Very severe headache of the neuralgic kind, is frequently caused by diseases of the teeth and the irritation produced by the pressure of dead roots in the jaw. In illustration of this, I will quote a few from many cases:

CASE 20. "*Inveterate headache cured by the extraction of many roots of carious teeth.*—(Fabricius Hildanus.) A lady was afflicted with a very severe continued pain in the left side of her head. The violence of the pain was chiefly experienced in cold, damp weather. By the advice of her physicians, she had tried a great many remedies, internal and external, but without success. Finally, I was called to see her. I carefully examined all the causes of her malady. I learned from her that for six months she was afflicted with an agonizing pain in the teeth of the left jaw. After this, the pain somewhat abated, but left a similar one in the corresponding side of the head. I conjectured from that the headache was caused by the roots of dead teeth. Upon examining the upper jaw, I found four carious teeth whose roots were deeply planted. I advised her to have them extracted, to which she cheerfully consented. I then purged her freely and applied cups to her neck and shoulders, and directed an aposeme to be taken during four days in the morning. On the fifth, while fasting, I extirpated the roots." After other treatment of a kind then in vogue, but of no utility, the lady recovered.

CASE 21. "*Headache dependent upon the teeth.*—(M. Petit.) "The late Princess of Condé recommended to her physicians one of her protégées, to be cured of a headache of five years' duration. She had been bled twenty times, and finally M. Petit was requested to bleed her in the throat. This surgeon having examined the patient, was led from her complaint of a pain and weight in the lower jaw, to look into her mouth. He found some irregularity in the teeth, and upon close inspection

ascertained that the patient had an unnatural number of them, there being eighteen in the lower jaw. The second molar on each side appearing to be most crowded, he took them out, and in twenty-four hours the lady was cured of a headache of five years' continuance."

CASE 22. *Ophthalmia and loss of an eye by abscess upon the teeth.*—(Fab. Hil.) "A lady of Cologne was for a long time tormented with inflammation upon the last molar of the left side, which was carious. By the advice of physicians, she was frequently purged, and cupped between the shoulders, but as she refused to have the tooth extracted, the continued irritation of the gums occasioned inflammation of the eye on the same side, which finally destroyed the sight."

CASE 23. *Ear-ache cured by extracting a tooth.*—(Jourdain.) "A lady had long suffered with severe pain in the right ear. All the ordinary remedies were used without effect. At length she was asked if she had any carious teeth. She replied that she had not: that all her teeth were good and never gave her any inconvenience. Nevertheless, her mouth was carefully examined. At first sight all seemed right, but a close inspection showed external caries of the dens sapientiæ. As the pain of the ear extended to the angle of the jaw, and even a little along its base, I persuaded the lady to permit me to extract this tooth, which I suspected to be the real cause of the mischief. Three days afterwards, the lady was perfectly and permanently relieved."

A similar case is reported by Mr. Koecker.

Dr. Darwin relates several cases of serious disorder produced in adjacent parts and in the general system by diseased teeth. The following are very remarkable:

CASE 24. "Mrs. —, about thirty years of age, was seized with great pain about the middle of the right parietal bone, which had continued a whole day before I saw her, and was so violent as to threaten convulsions. Not being able to detect a decaying tooth or tender one, by examination with my eye or by striking them with a teaspoon, and fearing bad consequences from her tendency to convulsions, I advised her to

permit the extraction of the last tooth of the under jaw on the affected side, which was done without any good effect. She was then directed to lose blood and to take a brisk cathartic, and after that had operated, about sixty drops of laudanum were given her, with large doses of bark, by which the pain was removed.

"In about a fortnight she took a cathartic by ill advice, and the pain returned with greater violence in the same place, and before I could arrive, she suffered a paralytic stroke, which affected her limbs and her face on one side, and relieved the pain of her head.

"About a year afterwards I was again called to see her on account of a pain as violent as before, exactly on the same part of the other parietal bone. On examining the mouth, I found the second molaris of the under jaw, on the side before affected, was now decayed, and concluded that this tooth had occasioned the stroke of the palsy, by the pain and consequent irritation it had caused. On this account I earnestly entreated her to allow the sound molaris of the same jaw, opposite to the decayed one, to be extracted; which was forthwith done, and the pain of her head immediately ceased."

CASE 25. (Darwin.) Since the above was first published, I have seen two case which were very similar, and seemed much to confirm the above theory of sympathetic hemicrania, being, perhaps, always owing to the sympathy of the membranes about the cranium with those about diseased teeth.

"Lord M. and Mr. B., of Edinburgh, both of them about the middle of life, were afflicted with violent hemicrania for about two years; in the beginning of which time, they both assured me that their teeth were perfectly sound, but on inspecting their mouths I found all the molares were now so decayed as to have lost their crowns. After having suffered pain for sixteen or eighteen months, almost incessantly, in different parts of their heads, they had each a hemiplegia, from which they gradually recovered as much as paralytic affections generally do recover. All the stumps of their teeth, which were useless, were directed to be extracted, as the swallowing so

much putrid matter from decaying bones, seemed to injure their digestion."

Sir Henry Halford, in a paper on tic-douloureux, read before the College of Physicians, related the following cases which came under his own observation:—

CASE 26. "A lady, forty years of age, suffered under the violent form of tic-douloureux, at Brighton, notwithstanding the careful attention and skill of a very judicious physician there. On returning to town, it was observed that the rending spasms, by which the disease is marked, were frequently preceded by an uneasiness in one particular tooth, which exhibited, however, no signs of unsoundness; but the constancy of this symptom was enough to justify the extraction of the tooth in this instance; and on its being drawn, a large exostosis was observed at the root of the tooth, and the lady never suffered more than very slight attacks, and these very seldom, afterwards."

CASE 27. (Sir Henry Halford.) "The late Earl of C. underwent martyrdom by this disease, and excited the warmest sympathy of his friends by the agonies he sustained for many years. He submitted to the operation for the division of several branches of the fifth pair of nerves repeatedly, by Sir Everard Home and Mr. Charles Bell, without obtaining more than temporary relief. At length he was seized with apoplexy, and lay insensible for some days, and in great peril, from the attack, but finally recovered. After the apoplexy the paroxysms of tic-douloureux became less frequent and less severe, and were administered to satisfactorily by an ingenious physician, who wrote his inaugural exercise on the disease. For the last year or two of his life, his lordship ceased to suffer from the tic-douloureux, and died at an advanced age, without any marked malady. While I attended him he *underwent repeated exfoliations of the alveolar process of the teeth*, which I thought occasioned his torment."

Doubtless, the exfoliations being completed, and the disease of those parts removed, the irritation ceased, and the patient recovered. It is melancholy to think of the protracted suffer-

ing which rendered the life of this unfortunate nobleman wretched and comparatively useless, and which might probably have been cured with little difficulty, if such men as Sir Everard Home and Mr. Charles Bell had been aware of the sympathetic disorder which may be, and often is, produced by diseased teeth. These eminent gentlemen not only did no good, but they inflicted great additional pain on their unhappy patient; but, doubtless, he would have fared little better in other hands, for the profession, while searching with powerful microscopes for causes of disease, entirely overlook the teeth, though reason and experience, the demonstrations of the anatomist, and the voices of the most discerning of the masters in medicine, are continually pointing them to the important sympathies of these organs.

From its relation to the teeth of the upper jaw, the fangs of which frequently perforate its floor, the antrum is often the seat of disease of a serious and sometimes fatal character. resulting from irritation produced by diseased conditions of these highly sensitive organs. Indeed, the teeth are directly or indirectly concerned in most of the diseases of the antrum. Boyer, Deschamps, Harris, and most others who have written upon this subject, give united testimony to this fact.

Dr. Harris, in the second edition of his valuable work on Dental Surgery, records several cases in evidence of the facility with which diseased teeth may propagate disorder to the antrum, and the formidable diseases which may result therefrom. I select the following:—

CASE 28. (Dr. Harris.) “Mrs. L., at twenty-seven or twenty-eight years, of a scrofulous habit, had been at times affected, for more than two years, with a deep-seated pain in the right side of her face, midway between the orbit and the alveolar ridge, and on closing the left nostril, and making a violent expiration through the right, discharged a slightly, yet perceptibly fetid mucous matter, which occasionally excoriated the mucous membrane lining this cavity of the nose. The pain, from the fact that it was most severe in cold and damp weather, was thought to be rheumatic. General and local

bleeding, fomentations, mustard plasters, purgatives, anodynes, tonics, and many other remedies, had been employed in vain.

"A severe paroxysm of toothache, about this time, more than two years since she first felt the deep-seated pain in her cheek, induced her to apply to me.

"On examining her mouth, the crowns of the second molar, dens sapientiæ, and first bicuspid of the affected side, were found to be destroyed by caries; the gums, covering the sockets of their roots, were inflamed and very sensitive. It was the roots of the wisdom or third molar tooth that ached. Extraction being the only remedy that held out the least prospect of relief, I at once proposed the operation, and, at the same time, urged upon her the importance of having the roots of the second molar and first bicuspid removed. A great deal of persuasion was necessary to obtain her consent, she being of an exceedingly nervous and timid disposition; but, having made up her mind to submit, she determined to have the operation performed immediately. She had no cause to regret it; for not only was she freed from the annoyance which the roots had occasioned to her tongue, gums, &c., but the operation was also followed by a speedy subsidence of the pain in the cheek, and a cessation of the fetid discharge from the nose."

CASE 29. (Dr. Harris.) "In December, 1841, I was consulted by Mr. S. M. J——, twenty-three years of age. He had been affected for several months with a dull heavy pain, which, as he said, seemed to be seated deep in his right cheek; and as in the case last described, a fetid mucous matter was discharged from the nostril of the affected side, on making a violent expiration, though it, with the other nasal cavity, closed. His teeth, to all appearance, were perfectly sound; but his gums, around the first and second bicuspides and first molar, were inflamed, spongy, and slightly ulcerated between their edges and the necks of the teeth, from which they had separated, to the edge of the alveoli. This condition he attributed to a blow which he had received by a fall, upon these teeth, about two years before. It was immediately followed by pain, inflammation, and, in about two months, the exfolia-

tion of several small portions of the alveolar processes, which came out through the gum. These were the only unpleasant effects which he experienced at the time, but afterwards there was always a slight soreness in the teeth that had received the injury. This gradually extended higher and higher into the substance of the jaw, until about four months previously to his calling upon me, when its place seemed to be taken by the kind of pain first described, and soon after, the fetid discharge from the nostril was discovered.

“That the deep-seated pain in the right superior maxillary was occasioned by inflammation of the mucous membrane which lined the sinus, I could not doubt; and that this had resulted from the alveolar irritation caused by the violence that had been inflicted upon the bicuspid and first molaris, to me, was equally evident. I therefore proposed the extraction of the teeth, to which he consented. Three weeks afterwards the pain in his jaw had entirely disappeared.”

CASE 30. (Dr. Shepherd.) *Neuralgia vs. Toothache*.—

“Neuralgia has become a very fashionable disease now-a-days, and many persons suffer long and severely, and ransack the whole materia medica in search of remedies; and finally an examination of the teeth is thought of, the very first thing that should have been done. In nine cases out of ten of supposed neuralgia, the extraction of some badly-decayed tooth, which the suffering individual knows ought to have been out more than a year ago, perhaps, would cause a subsidence of all symptoms of neuralgia.

“As a prominent example of the above, I am induced to report the following case:—Miss C. W., a resident of this town, of delicate constitution, was attacked with severe pain in the right side of the head, neck and shoulder, about twelve months ago; and from the severity of the pain, and other circumstances attending it, she came to the conclusion that it was neuralgia; and by concurrence with her medical adviser, her opinion was confirmed. She used, therefore, all possible remedies for that disease, without success. In the mean time her attacks were growing more frequent and more severe; and for the last

two or three months, they occurred daily at precisely five o'clock in the afternoon, and continued with the most intense severity until midnight; when the pain would begin gradually to subside, growing less and less until she was perfectly easy. These daily attacks came on with such perfect regularity that, to use her own words, 'five o'clock was a terror to her before it came.' At this stage of the disease she was in Baltimore, whether in search of medical advice or not, I do not know; but while there she consulted Dr. B., an eminent physician of that city; and he advised her to have her teeth examined, intimating that they might be involved; he gave her, at the same time, a prescription for neuralgia, to be used in case the teeth were not at fault. With this advice she returned home, and sent for me, and related to me substantially what I have stated above. I examined her teeth, and found the inferior wisdom-tooth of the right side decayed to the nerve, and I gave it as my opinion that all her 'neuralgia' originated there; I therefore advised its immediate extraction, to which she assented. The first day after the tooth was extracted she had very little pain, the next still less, and the third none at all.

"Thus a perfect cure was effected, of what perhaps nineteen out of twenty of our very best physicians would have pronounced neuralgia, without once thinking of the teeth, by the simple extraction of a bad tooth.

"I do not offer the above as a case of rare occurrence; I have often met with such in the course of my dental practice, as doubtless dentists in general have; and I cannot account for the fact, that physicians so generally prescribe for neuralgia, without once thinking of the teeth, when there is so striking a similarity to true neuralgia in many cases of toothache. In the case above, there were some striking peculiarities, which would have been, perhaps, sufficient to screen the most vigilant from the charge of superficiality in the examination of his patients, though he might have forgotten the teeth. The duration, the regular increase of pain, the extent to which the system was affected, and when the attacks became daily, the perfect uniformity as to the time of commencement, together with

the nervous temperament of the subject, were all circumstances well calculated to mislead the judgment; and yet this proved to be a case of toothache, a fact which might have been proved just as easily in its very commencement, if an examination of the teeth had been once thought of as a matter of any consequence."

The cases above mentioned are but a few of a great number that might be collected, showing the importance of the teeth, in their healthy and unhealthy conditions, to the well-being of the whole economy. Surely those here presented will be sufficient to arouse the physician to the necessity of regarding the agency of these organs in the production and continuance of diseases, and to impress the dentist with the importance of pursuing his vocation, not as a mere mechanical craft to be exercised upon isolated excrescences of the body, but as a part of curative science, embracing in its relations, the knowledge of diseased life as manifested by many organs, or by them all. The general surgeon must be more than a mere cutter of flesh or setter of bones; the obstetrician more than a man midwife; and the dentist is unworthy of the confidence or respect of the community who is not well-informed upon the nature and history of disease, and the part which the organs upon which he operates perform in its causation, or modification.

It is strange that physicians have paid so little attention to this subject. It would be less so, if so many of the ablest writers among them had not so earnestly and repeatedly proclaimed the importance of giving to the teeth their due consideration in the diagnosis of disease. But when Hunter, Rush, Darwin, Halford, Chapman, and other such men, have taken special pains to direct the attention of the profession to the subject, it is unaccountable that their voices have been altogether unheeded.

Unfortunately, it has now become the fashion to study pathology in the corpse-house, rather than by the bed-side; to make microscopical inquisitions of disease upon the dead, rather than to observe its phenomena in the living. From the very necessity of the case this necrological research falls into the hands

of the young and inexperienced, and these become writers and teachers before they have been to the only sure school of medicine, the chamber of the sick. As the teeth may be seen by the naked eye, they are not likely to be considered of much importance. Had they been discernible only by the microscope, they doubtless would have received due consideration. It is said that the celebrated Pennant, by use of the microscope, lost the use of his eyes. I fear that this is too commonly the fate of his successors.

I fully coincide with Dr. Fitch, who well remarks: "We are not to condemn the diseases of the teeth because they seem insignificant. Many persons are formed of a fibre so fragile, as to be broken by the slightest shock; of a stamina so delicate, as to be affected by the slightest impression. Disease in its steps at first is, as it were, soft and hesitating, weak in its powers, and slow in its progress. But every instance of indulgence, and each succeeding advantage gained, confirms its step, increases its powers, and hastens its progress, and what but a moment ago seemed a thing too insignificant to mention, now rises a monster that derides human effort, and whose sting is the arrow of death.

"Almost inappreciable are the beginnings of many fatal diseases; and could the grave reveal its secrets, I have not a doubt, when I consider the number of diseases produced by diseased teeth, that it would be found that thousands are there, in whom the first fatal impulse was given by a diseased state of these organs; and could I raise my voice so as to be heard by every medical man in America, I would say to them, attend to your patients' teeth, and if they are diseased, direct such remedies as shall restore them to health; and if in health, such means as will keep them so."

CHAPTER XVIII.

WOUNDS OF THE MOUTH AND FACE.

THE face, with all the organs which enter into its structure, is exposed to the several forms of injury which are known by the common name of wound.

Surrounded as the human body is by a great number of substances denser and more resistant than itself, it is liable to have its tissues separated, penetrated, torn, violently compressed, or broken asunder. Consisting, also, of a number of elements constituting organized parts, and held in union by the mysterious force of vitality, it is also liable to have this union dissolved by the action of forces more powerful than life, and to be chemically disintegrated.

As the face from the necessity of the case must be uncovered, and as from its position it is most liable to be injured by falls or reached by malicious blows, it is more frequently wounded than any other part of the body; and owing to the deformity which attends scarring of the countenance as well as the importance of the organs connected with it, facial wounds require more nicety in their management than any others.

The mouth is very frequently involved in these injuries, and the teeth are often displaced or fractured by them. The manipulations required for the reparation of these wounds require a dexterity only to be acquired by daily observation of the teeth in their natural positions, and the habit of handling and operating upon them. The dentist, if believed skilful, is therefore often called upon, even by the general surgeon, to aid in the management of such cases.

In medical language, a wound is a recent lesion or interrup-

tion of the continuity of parts from an external cause; but the term is made to include all hurts received from agents acting mechanically or chemically upon the surface of the body.

Wounds differ materially from one another, in kind, extent, position, and character of the parts wounded.

When the parts are merely divided by a clean, sharp instrument, with as little injury to the separated tissues as possible, the wound is called a *Simple Incision*—(*simple incised wound*).

If the parts be rudely torn asunder, the injury is called a *Laceration*—(*lacerated wound*). If the part be violently and suddenly compressed, so as to rupture some of the small vessels and break or otherwise injure the muscular fibre, skin, &c., the injury is called a *Contusion*, or *Bruise*—(*contused wound*). If a pointed instrument be forced into the body, penetrating tissues, it causes a *Puncture*—(*punctured wound*). If a bone be broken, the wound is called a *Fracture*. Injuries from bodies propelled by gunpowder are called *Gun-shot wounds*, and from fire, *Burns*. To these may be added *Poisoned wounds*, or those in which a slight puncture or trivial laceration becomes the means of introducing venomous matter into the system; such wounds are inflicted by certain insects, serpents, and rabid animals.

Simple Incised wounds are, per se, the least serious of all injuries, though from the flow of blood which attends them, they are generally the most alarming.

In these cases the parts are simply separated, of course not without injury at the immediate line of division, but without any which suspends the vital action of the separated surfaces, or breaks up their relation, so as to render readaptation difficult.

Of course these wounds may be of the most serious nature, or immediately fatal, if large vessels be divided or vital functions interrupted by them. In these cases the danger is not from the nature of the wound, but from the accident of its seat.

Commonly the most alarming and most dangerous complication of incised wounds, is the bleeding or hemorrhage which

attends them. This will be greater or less, according to the size and character of blood-vessels divided, the form of the incision, and the vascular activity, &c., of the patient.

A wound of this character may be attended by venous or arterial hemorrhage.

A slight incision will commonly be attended by a gush of dark-coloured blood from the superficial veins. This flows freely for some minutes, but if the wounded part be not officiously bathed, and especially if it be bound up, the hemorrhage soon ceases, and does not again return.

Sometimes the gush is so considerable as to cause the patient to *faint*, or, in medical language, to induce *syncope*.* In this condition the patient has temporarily lost his consciousness, his skin has become cold, and his pulse ceased to be perceptible.

This state, though apparently very dangerous, is by no means so, unless the patient has previously been much exhausted. On the contrary, it is salutary; for it checks the hemorrhage, and affords time for the permanent closure of the wound in the way to be described presently.

As the syncope depends upon the want of circulation through the brain, the patient should be placed in a recumbent position with his head low. If fainting be feared in any case, this is the best position and the best means to prevent it.

The arrest of venous hemorrhage depends upon the singular and most important quality possessed by the blood to solidify or coagulate when exposed to the air. Without such a provision, the slightest wounds would be very troublesome, and often fatal.

As soon as a coagulum forms about the orifice of the wounded vessel, the bleeding ceases, and the current of blood, finding no longer an artificial egress, pursues its natural course.

It is evident that if the flow of blood be very great, or if the wound be very large, the coagulum will be longer in forming a sufficient barrier to the hemorrhage. For the blood must be

* Syncope, Συγκοπη—I fall down.

at rest before it can coagulate, and the amount which, under these circumstances, will be arrested by the edges of the wound, etc., and detained until coagulation, will bear but a small proportion to the current, and will be constantly washed away by it.

It is in such cases that fainting is sure to occur, and by this means the flow being stopped, the blood at the moment filling the wound is arrested and coagulates before the action of the heart is recovered.

Sometimes, however, it happens that small veins will bleed obstinately and profusely; owing to the peculiar irritation of the wounded part or the indisposition of the blood to coagulate.

It is evident that compression of the lips of a wounded vessel so as to obstruct its channel, is the readiest way to stop the hemorrhage, and that as the flow of blood in the veins is towards the heart, the pressure should, when these vessels are wounded, be especially upon the distal extremity of the wound. Inasmuch, however, as the veins anastomose* freely, pressure must be exerted upon both sides of the wound.

As soon as the flow of blood through the vessel is arrested, the blood begins to coagulate at the point where it is impeded, and in a little while a plug of coagulum effectually stops each end of the divided vein.

It is never necessary to tie a vein, unless it be of the largest size, and the operation is always very dangerous. Arteries may be tied with impunity; but the veins, when thus treated, are very apt to develop an inflammation of their lining membrane (phlebitis†) which is rapidly propagated to the heart, and is generally fatal.

Styptics,‡ of many kinds, have been employed more or less for ages, for the stay of hemorrhage.

These are astringent substances which corrugate the animal fibre, thus contracting the orifice of the wound, or articles of a

* Anastomose—communicate by a number of mouths; from *Ανα*, and *Στεμα*, a mouth.

† Phlebitis, from *φλεψ*, a vein.

‡ Styptic, from *Στυφειν*, to constrict.

porous or loose texture, which arrest a considerable quantity of blood, and thus form a clot.

Alum, the mineral acids, cold water, &c., are of the first class; agaric, sponge, spider's web, fur, &c., of the latter.

These articles are only useful where small superficial vessels are concerned.

Arterial is far more serious than venous hemorrhage. The arteries circulate more blood and with more rapidity. The blood from an artery is red, that from a vein purple and nearly black; the blood from a vein flows steadily, from an artery it flows by leaps or jerks (*per saltum*). These characteristics will serve to distinguish the nature of the vessel injured.

The rule, however, is not without exceptions. If a vein lay directly over an artery, the impulse of the latter may be so sensibly communicated to the former as to cause the blood to flow *per saltum*. Again, in one instance the author found the venous blood of a plethoric patient to be as red as arterial, when issuing from the orifice. This, however, is very rare.

The loss from arteries is therefore much greater than from veins. Moreover, the arteries contract and expand, and force their blood by this process, through their canals in *jets* or *gushes*. Hence it is almost impossible for a coagulum to form of sufficient size to resist the force of the propulsion. An artery, unless of very small size, if once divided by a clear incision, will continue to bleed until the patient succumbs from exhaustion, unless artificial aid be afforded.

The means of arresting arterial hemorrhage are, compression, ligature, laceration, and the actual cautery.

Compression may be exerted either upon the trunk of the vessel at a spot nearer the heart than the wound, and where its superficial position or relation to a bone renders pressure more easy and complete, or upon the lips of the divided vessel.

Pressure upon the trunk of the vessel can afford but temporary relief, as the current of blood will soon find its way through anastomosing branches into the vessel beyond the impeded point; upon the lips of the wound, unless very much favoured by position, it can rarely be perfect, as the arteries

for the most part lay deep, and the means of compression must be applied at the bottom of the wound.

The *ligature* is by far the most important of the means used for arresting hemorrhage, and the discovery of its adaptedness is the greatest advantage of modern over ancient surgery.

The ancients supposed that the arteries contained a mysterious something, which they called the animal spirits, and to prevent the egress of this, they resorted to the actual cautery; thus adding a most painful and dangerous burn to a wound often large and sufficiently serious.

An artery is composed of three coats, viz.: the outer or fibrous, the middle or muscular, and the inner or serous.

When a ligature is tied firmly around the vessel, the outer coat, being firm and strong, remains unbroken; the middle and the inner or serous coat, are always lacerated.

The effect of the ligature then is: 1st. To rupture the middle and internal coats of the artery. 2d. To bring the lacerated parts into close contact. 3d. To produce adhesive inflammation by the exudation of coagulated lymph. 4th. To cause the formation of a coagulum in the obstructed vessel; and 5th. To cause ulceration of the outer coat, by which the ligature is liberated and the wound suffered to unite.

It appears then that the final closure of the vessel is the result of a most wise and benevolent provision of the Creator, which enables us, through the structure and vital properties of the arteries, to procure their obliteration at such point as we may select.

This provision would, however, be entirely nugatory unless some means were provided by which parts thus deprived of circulation should receive it through other channels. But this means is provided in the facility with which, under these circumstances, the anastomosing branches are enlarged. Through these rapidly-expanding canals the current of blood presses towards its destination, and in a few hours the inconvenience resulting from the complete obstruction of such trunks, even as the carotid and external iliac, is permanently remedied.

In placing the ligature, which should be of hard-twisted silk,

around the artery, great care should be had not to enclose in it the nerve or vein which commonly attend the former. Serious and even fatal consequences would follow such a blunder as this. When the external coats of the vessel are so soft as to give way before the ligature, a little of the surrounding cellular tissue or muscular fibre may be enclosed within the thread.

The method to be pursued in reaching each particular artery will be found in the works on general surgery. It is not within the design of the present work to describe them.

We have mentioned *laceration* as one of the means of arresting hemorrhage.

When an artery is *torn*, the internal coat is, of course, brought into the condition produced by the ligature, except that the opposing surfaces are not pressed together. It generally happens, however, that the shock of this kind of injury interrupts the contraction and expansion of the vessel, and a coagulum is thus permitted to form. This mode of operation is only proper when we have to deal with small vessels. Their bleeding may generally be arrested by seizing them with the forceps and twisting them so as to rupture their internal coats.

The actual cautery* is a terrible means, which should only be used under peculiar circumstances.

We have already said that until within a comparatively short period, searing with a red-hot iron was the means commonly employed to arrest arterial hemorrhage. Stumps, after amputation, were submitted to this dreadful application, adding vastly to the terror and pain of operations which even now seem almost too severe for endurance.

The cautery, by disorganizing the extremity of the vessel, and corrugating the animal fibre, is an effectual preventive of hemorrhage, and may be resorted to when there is no other resource.

It sometimes happens that an injury is done to a bone, which opens an artery imbedded in it; the same happens, occasionally,

* The actual cautery is fire or a heated body, the *potential* certain chemical substance, which combine with and destroy the tissues, as nit. of silver, pure potass, &c.

in operating upon these organs. Under such circumstances, it is sometimes impossible to use a ligature.

It also happens occasionally that in the extraction of a tooth, a vessel is ruptured which continues to bleed freely for hours, and even days, after the injury; and the hemorrhage is not only exceedingly inconvenient, but sometimes is sufficiently great to be alarming.

Under these circumstances, after ineffectually stuffing the socket with lint, &c., medicated by alum, the mineral acids, &c., it becomes necessary to use the actual cautery.

Owing to the very small surface to which the heated body is to be applied, this can be done without much pain to the patient, and will, if dexterously accomplished, afford prompt relief.

A probe ending in a small button, or some other metallic body of suitable size and form, should be heated to a white heat and carried suddenly to the bottom of the socket. Care should, of course, be taken not to touch the tongue or cheeks.

The potential cautery will also accomplish the purpose, but the hot iron is more prompt and not more painful.

If the hemorrhage from a simple incised wound be merely venous, we need not be concerned about it; it will soon cease, unless the trunk be very large.

The treatment of incised wounds consists in bringing the edges of the wound close together and keeping them in contact. This done, nature performs the cure by throwing out lymph, which cements the adapted edges together, and becoming organized, forms a permanent bound of union.

When this is accomplished without suppuration, it is called by surgeons, "the union by the first intention."

This mode of union leaves but a very slight cicatrix and occasions the least deformity. It is, therefore, especially desirable in all wounds of the face and neck.

It also is attended with the least possible contraction of the parts, and is, therefore, as well as for other obvious reasons, very desirable in all wounds of the mouth.

It will be noticed, that we propose no means for *curing*

wounds. The truth is, we have none, and none are wanted. Nature is abundantly capable of repairing these injuries, if the parts be placed in a proper relation, and be protected from the external air, which is a positive irritant to the internal surfaces.

There is no virtue in salves or balsams to heal simple incisions; but these applications may retard the cure and cause suppuration where none would otherwise have occurred.

There are several means for approximating divided surfaces, and keeping them in contact. They are adhesive plasters, sutures, and bandages.

Of these, adhesive plasters are the most important. They are generally sufficient to approximate the parts closely, and unless very great nicety be required, will generally answer all desirable purposes.

The solution of gun cotton in ether, which has recently been introduced into surgical use, promises to supersede sutures to a considerable extent.

Sutures or stitches, are threads passed through the lips of the wound and then tied, holding the divided surfaces together. When very muscular and contracted parts are divided, such as the lips or the eyelids; where it is important to prevent deformity, and where the wound is too deep to be closed by adhesive straps; where, from the moisture of parts, adhesive plaster would not be available; or when, as in lacerated wounds, the parts have been broken into small and irregular fragments, not affording sufficient sound surface upon which to fasten the plasters; in such cases, sutures are useful.

Lacerated wounds bleed less profusely than simple incisions. The injury done to the vessels is commonly of a kind which paralyzes them for the moment, or at least so far enfeebles their function as to prevent active hemorrhage.

This is sometimes the case even when large arteries are torn asunder. Cases have been observed where the arm has been torn from the shoulder by machinery, and the arteries left hanging out from the wound, yet no serious bleeding ensued. In the experiment by Dr. N. R. Smith, the carotid artery of a

horse, when ruptured by a blunt hook passed under it, bled but little. The absence of bleeding in extensive lacerations, though immediately convenient, yet indicates an amount of injury to the parts far greater and far more difficult to remedy than that which attends incisions.

The parts may be entirely destroyed; or their vitality may be so far lessened as to make them incapable of resisting the inflammation which will result, and cause them to mortify.

Wounds of this kind do not heal by resolution; they will suppurate, and consequently the cicatrix that results is more unseemly than is left by simple incised wounds. The pain is generally in inverse proportion to the extent of the injury: small lacerations causing great suffering, while those which are very extensive so benumbing the sensibilities as to cause but little. A miller, whose arm and scapula were wrenched off by a wheel, did not know what had happened until he saw the arm revolving round it. There was, as usual in cases of this kind, no serious hemorrhage. The indication in lacerations are to cleanse the wound of any foreign substances, such as sand, gravel, &c., and to unite the ruptured parts, as nearly as we can, without inflicting serious additional injury.

A difference of opinion exists as to the proper application. Inasmuch as the part is at first cold, and the circulation weak, it has been the common practice to apply some stimulating applications, such as turpentine, or some spirituous preparation; and when inflammation is established, to dress the wound with warm poultices, in order to promote the suppuration.

The most eminent surgeons of the present day, however, prefer very cold applications, such as ice or ice-water, in order to allay the inflammation, which is sure to occur, and which is apt to be excessive.

The probability is that the wound, like an incised wound, does better without any dressing at all, except its own blood, which protects it from the air and forms a soft, well-adjusted cushion between the wound and the bandage, which, of course, should be thrown around it, so as to protect it, but loosely.

The author once saw a wound of this description, of an ag-

gravated character, which was treated in the way described by Dr. N. R. Smith. The patient was a boy, whose hand had been caught in an agricultural machine. His fingers were literally crushed, the phalanges splintered, and the flesh torn up and hanging in rags about the broken bones. The joints of the fingers were, for the most part, disorganized, and the organ presented so hopeless a condition, that amputation seemed inevitable, and Dr. Smith was invited to perform the operation. This experienced and skilful surgeon, while he admitted the apparently hopeless condition of the wound, observed, very justly, that it would be time enough to amputate when the parts should become gangrenous or some constitutional symptoms of an imperative character should supervene; that injuries of the hand were not apt to occasion tetanus; and that he would advise to let the wounded member alone, to see what nature would do.

A few spiculæ of bone were removed, and the hand was, without having been washed, bound up in its own blood.

To the surprise and gratification of all concerned, the wounds healed rapidly; and although, from loss of bone and rupture of joints, the fingers remained deformed, stiff, and crooked, the boy finds them very much more useful than a stump would have been.

Contused wounds do not differ very materially from lacerations. They, too, require to be let alone, unless the inflammation succeeding be so great as to require the treatment heretofore described as proper for such conditions.

Contused wounds are generally attended by an effusion of blood beneath the skin, which gives the parts a black or deep blue appearance. As the absorbents slowly take up the extravasation, the colour becomes greenish and yellowish, and finally disappears.

With regard to both these kinds of wounds we may say, that whatever treatment they require is demanded by the inflammation which follows them, and must be modified to suit the degree and character of it, without regard to the traumatic cause of it.

Punctured Wounds.—These are injuries made by a pointed instrument, penetrating to some depth, and characterized by

an opening very small in proportion to the extent of the wound. Very often, the instrument by which the wound is inflicted is of a shape, designedly devised, for the purpose of inflicting the greatest possible amount of injury. A bayonet, for instance, is triangular and pyramidical, much broader at the base than the point. Of course, it is forced into the body like a wedge, and bruises and lacerates the parts exceedingly.

A punctured wound, other things being equal, is a much more severe injury than a simple incision. It is both a lacerated and contused wound, and of course is fraught with the peculiar dangers attending such injuries. But, moreover, it is inflicted upon deeply-seated parts; vital organs may be reached; large vessels and nerves punctured; even bones penetrated or splintered. Wounds of the more deeply-seated parts do not heal with the same facility as the skin; they are more out of reach of dressing and manipulation; they suppurate, and the matter is liable to form sacs or pouches, or to be infiltrated into the adjacent parts, acting as an irritant, and spreading inflammation in its course.

The constitutional impression also is greater when deeply-seated parts are wounded, than when superficial injuries, even of greater extent, are suffered.

The danger of punctured wounds depends upon the extent, situation, and character of the injury, and the age, constitution, &c., of the subject.

The indications for the treatment of a punctured wound are, 1st. To remove any fragment of the instrument by which the injury has been inflicted; 2d. To secure any artery which may have been wounded; 3d. To place the part in the easiest and most relaxed position; and, I am tempted to say, 4th. To let it alone. I am convinced that much injury is done by attempts to aid nature in her efforts at reparation, when she is abundantly competent to complete the work without active assistance. Some surgeons inject stimulating applications, in order to bring about inflammation, which is sure to ensue soon enough if the health of the patient permit. Others advise to lay the wound open, and lengthen it so as to convert it into a deep incision.

This is often impracticable without doing vast injury, is always painful, and when accomplished will not prevent the natural consequences of the laceration already suffered. The object of this practice is to prevent the accumulation of the matter; but generally it will escape readily enough; and surely it will be time enough to provide for the evacuation of retained matter, when it shall be ascertained to exist.

Sometimes the lips of the wound tend to heal before the more deeply-seated parts have established their suppuration. This can be prevented by introducing a pledget of lint, or a "tent," into the wound, and keeping it there until the growth of granulations from the bottom and the adhesion of the sides are completed.

The tent should be removed every day, and a shorter one introduced, from time to time, until the cure be completed.

Constitutional symptoms are to be treated upon general principles. Before inflammation is established, and while the system is suffering from the pain and shock, opium will be our most important means. Should inflammatory symptoms run high, bloodletting and other antiphlogistic means will be required.

Gun-shot Wounds are violent contusions made by dense bodies moving with great momentum. The injuries thus inflicted are serious in proportion to the extent of the wound and the importance of the parts involved. These wounds generally bleed but little, but even when slight, and penetrating only fleshy parts, they produce a remarkable constitutional shock, manifested by faintness, feeble pulse, and muscular weakness.

Gun-shot wounds must be treated upon the principles which apply to all other mechanical injuries. If the ball or other projectile can be removed without difficulty, it should be done; if it cannot be readily found and dislodged, it is better to let it alone, as much more injury will be done by groping after it among the lacerated parts, than by its presence. Generally it will come away in the suppuration. Sometimes the wound heals over it, and it may remain for years imbedded in bone or muscle, without causing inconvenience.

The notion which prevailed formerly, that lead, when projected by gunpowder, is poisonous to the flesh, is a mistake. This metal does no injury, except by its weight.

Burns.—Injuries caused by the action of fire or heated solid bodies are indiscriminately called *burns*; when the result of contact with heated fluids they are called *scalds*. Of course injuries from these agents must differ very much according to extent and degree; varying from the slightest perceptible erythema to gangrene of the parts, and from a very limited to a very wide-spread wound. Indeed, under the common name burn, as under the general term wound, are grouped together a great variety of injuries, alike only in the fact that they are caused by fire or heated bodies. Yet it is common to speak of remedies for *burns*, as though all of these injuries were alike, and required the same treatment. There is no branch of surgery in which empiricism retains its ground as firmly as in the treatment of burns. A great number of applications have been lauded as specific for these conditions, and when, from some terrible accident, a large number of persons are scalded, it is mortifying to notice the want of all agreement among physicians as to the proper management of the distressing cases which clamour for relief, and the dogmatic empiricism with which nostrums are insisted upon by professional men, who are unable to give any satisfactory reason for the extraordinary confidence in their own suggestions.

Some years ago a steamboat started from the wharf in this city, upon a trial trip, and exploded before she had gone a hundred yards. Many persons who thronged her decks were scalded and blown into the water. When taken out, they were chilled and shivering, with feeble pulse, labouring under great constitutional irritation.

Under these circumstances, it was painful to notice the modes of treatment adopted, upon opinions of specific virtue in certain agents, without any apparent regard to the probability of good, as inferred from their known qualities, and the condition of parts to which they were applied.

Cold water, spirits of turpentine, raw cotton, soot, soap,

with many other applications, have been strongly advocated as dressings for burns; yet certainly it would require an utter disregard of rational conduct to apply turpentine to the extended surface of an abraded cutis, or cold water to the shivering skin of a feeble patient, whose whole constitutional effort cannot accomplish reaction.

The danger of burns is in proportion to extent rather than degree. A small portion of the body might be burned to complete destruction, with far less danger than a large surface could be reddened and vesicated.

Scalds, therefore, which are superficial burns, are very dangerous, because, from the diffusible nature of their cause, they are generally extensive.

The reason is, 1st. Because the *pain* of burns is the prime cause of the constitutional distress, and of the serious or fatal consequences that ensue, and superficial burns of the skin are generally most painful and most extended; 2d. The skin has powerful sympathies with the mucous membranes of the bowels and lungs, and these are very apt to assume serious inflammation when the skin has been extensively scalded. 3d. The functions of the skin are important, and cannot be extensively interrupted with impunity.

From the last two causes, it happens that persons scalded in steamboat explosions are apt to die of pulmonary engorgement, and not because they have "inhaled steam," as has been so commonly supposed.

Where burns or scalds are superficial, the great object is to protect the irritated surfaces from the air, which is most distressing to them. To this end, nothing is better than the raw cotton, which, to prevent its adhesion to the sore, should be moistened with some unctuous substance. Linseed oil and lime water mixed together are commonly used for this purpose, and the mixture answers very well. The cotton thus treated forms a soft, warm, innocent dressing, and is as good a substitute for the skin (and this is what we want) as we can procure. Wheat flour or other farinaceous matters sprinkled on until the part is completely covered and protected, will answer

a similar purpose. For obvious reasons, the cotton is preferable. A coating of gum arabic, applied in solution, has been used with good results.

An admirable application, which I have found to be attended with the best effect upon a superficial burn of the face, to which it was applied, is raw cotton steeped in solution of gun cotton. The application at first causes some smarting, but as the ether evaporates, the part becomes easy and remains remarkably comfortable.

If there be no blistering or abrasion of the surface, the injury being severe erythema, cold water will give immediate relief.

Sometimes the part upon which the burn has been immediately inflicted will be disorganized or nearly so; the surrounding parts, and those subjacent, partaking of the injury in proportion to their propinquity to the place of contact.

In such cases, as the vitality of the parts is nearly exhausted, and gangrene likely to take place, the stimulating agents, turpentine, &c., may be very properly employed.

In short, the treatment of burns, like that of other injuries, must depend upon the judgment of the surgeon, in view of the peculiar condition of the injury.

Burns leave large and unseemly scars, which pucker as they contract, and often cause permanent deformity by the shortening of skin and muscles. It is important, in the treatment of these injuries, to guard against this tendency as much as possible, by preventing those positions which, though most easy to the patient, will permit the contraction above mentioned. Care must be taken, too, that two burned surfaces be not brought together and kept in contact. I once saw a child whose hands were rendered entirely useless through neglect of this precaution. The palms had been burned, and the mother bound up the closed fists, and suffered them so to remain until palmar adhesion and permanent muscular contraction rendered the organs entirely useless.

FRACTURES.

A fracture is a solution of continuity of a bone, produced by violence, acting either by some external agent, or, occasionally, by the sudden and extraordinary contraction of muscles.

A fracture may take place transversely, obliquely, or longitudinally. The difficulty of adjustment and reparation will be in accordance with certain circumstances which give character and importance to the injury.

Cæteris paribus, a simple division of the bone transversely, or a longitudinal fissure of moderate length, will involve much less suffering from injury to the soft parts, and will be much more likely to heal without deformity, than a fracture which is oblique; because, in the former cases, there will be but little if any displacement of the broken surfaces of the bone, while in the latter the muscles attached to the separated part are apt to draw it out of its position, and cause it to ride upon the fixed portion. The action of the same muscles is of course continually opposing the force used to keep the restored fragment in place.

Fractures may be *comminuted*—that is to say, the bone may be broken into small fragments; they may be *compounded*, that is, may be associated with injuries, more or less serious, of the soft parts covering or covered by the bone, such as lacerations of the muscles and skin, protrusion of fragments of bone through the integuments, &c.

Fractures are said to be *complicated* when attended by some accident or condition which materially embarrasses the treatment and cure. Thus a large artery may be wounded, an important viscus injured, or a constitutional disease, affecting the vitality of the bones, may exist.

Treatment of Fractures.—The general treatment of fractures consists in meeting the following indications: 1st. To restore the displaced pieces of bone to their natural position. 2d. To keep them there; and 3dly. To afford any additional aid which the nature of the injury and the constitutional circumstances

may require. It does not always happen that the fragments are displaced. In such cases the duty of the surgeon, so far as the condition of the bone is concerned, requires no more than to support the parts, and place them in such a position as will best guard against displacement. It will be seen that the surgeon has nothing whatever to do with the production of bony union. That is entirely the work of nature, and is accomplished by the formation of a hard intermediate substance, which is called *callus*.

Soon after the injury, a swelling is observed around the broken ends of the bone, which gradually hardens until it surrounds the fracture with a kind of bony splint, within which the process of reparation goes on. This is called the *provisional callus*. As the cure advances, this hard swelling subsides, though it rarely entirely disappears, and the bone is found to be permanently united by an organized osseous substance, which well subserves all the purposes of the lost bone.

According to the experiments of Breschet and Villerni, the following are the principal circumstances remarked during the process of reparation of fracture.

1. Extravasation and coagulation of a small quantity of blood between the ends of the fracture, which blood escapes from torn or ruptured vessels.

2. A fluid, at first of a viscid quality, effused and secreted as it were between the periosteum and the bone, and likewise exuding from the surfaces of the fracture, and from the soft parts.

3. A gradual increase in the quantity and consistency of the preceding substances blended together, forming every day a stronger connexion between the parts; then their change to a red intermediate substance between the fragments, and between the bone and periosteum to a substance which is at first soft, but in the end acquires the character of bone.

4. At the fractured parts a reunion of the periosteum and soft parts, which are equally indurated and confused together with the intermediate substance between the fragments.

5. A diminution and then an obliteration of the medullary

cavity, at first by a cartilaginous, and then by a bony deposition.

6. Successive ossification of the whole of the swelling composing the callus, and of the substance between the fragments, preceded by a fibrous and cartilaginous state.

7. The return of the soft parts around the fracture, and then of the periosteum to their natural state.

8. After the union of the surfaces of the fracture, the medullary cavity and texture are gradually re-established, and the swelling formed by the callus always diminishes.*

Whatever may be the process by which callus is formed, it is during the first two or three weeks after the fracture that the fragments undergo the changes which promote their reunion. But it is within the twentieth and thirtieth, and especially between the thirtieth and fiftieth days, that nature labours effectually in consolidating the callus. Hence, at this period, our care to retain the ends of the fracture in exact contact and perfectly at rest, should be redoubled, for though there are a few instances in which deformity really proceeds from irregular ossification, it is a fact that the deformity almost always originates from the fracture being disturbed and not kept properly reduced.†

Fractures of the Jaws.—The lower jaw is liable to be fractured at any part of its extent, as between the symphysis and the masseter muscle, within the muscle, and between it and the angle. The bone may also be broken into two pieces simultaneously. Sometimes, also, the condyles, and less frequently the coronoid processes, are broken off.

Fractures of this bone may be perpendicular, oblique, or longitudinal. Sometimes a part of the alveolar process with its teeth has been split off.

When the fracture is near the symphysis, the submaxillary muscles will draw down the part to which they are attached, while the other fragment, released from the counteraction of those muscles, will be proportionably elevated by those which

* Cooper's Surg. Dic., Art. Fractures.

† Boyer.

close the mouth. When fractured in two places, the middle fragment will be drawn downwards and backwards, while the lateral portions will be supported by their muscular attachments. When the fracture occurs within the masseter, little displacement can take place, as the muscle attached to both fragments keeps them in their natural position.

Fractures of the lower maxillary may generally be detected without much difficulty.

If, after a severe blow or fall, there should be severe pain in the jaw, attended with laceration and swelling of the soft part; if the line of the bone be irregular; if crepitus be felt; if the gums be denuded, and if the level of the teeth be interrupted, there can be no doubt that fracture has occurred.

Nor is it necessary that all these appearances shall be present in order to satisfy the observer of the nature of the injury. As the bone can be traced with the finger along its whole length, and its level observed both upon the upper and lower margin, the displacement or crepitation, and the pain or disability of motion, will sufficiently indicate the kind and point of injury.

There is little difficulty in replacing the fragments of a fractured lower jaw. We have but to push the displaced part upwards and a little forwards, and press it exactly into a line with the fixed portion—observing that the teeth are also properly level. It is not so easy, however, to keep the parts in their proper place, but the upper jaw being fixed, enables us to sustain the lower one against it.

A piece of pasteboard, moistened and softened with vinegar or, if there be excoriation, with water, is first adapted to the basis of the jaw. A four-tailed bandage is then employed to keep the parts in position. This consists of a piece of muslin or flannel, several inches wide, the centre of which is perforated for the reception of the chin, and the two ends divided longitudinally, so as to make two tails on each side. The anterior of these are carried up the side of the face, and secured to a night-cap posteriorly, and the posterior tails anteriorly. The patient must keep his mouth closed as nearly as possible,

refraining from talking, and subsisting upon fluid or semi-fluid food.

Sometimes a tooth will be split in the fracture, and must be extracted. It sometimes happens, also, that the teeth are so irregular as to prevent the complete closure of the jaws, in which case a piece of cork may be so placed as to accomplish the purpose of supporting the lower by pressure against the upper jaw.

Dr. Rhea Barton, of Philadelphia, devised a bandage for fractures of the jaw, to which many surgeons give a preference. He commences with a roller an inch and a half wide, below the prominence of the occiput, and continues it obliquely over the centre of the parietal bone across the juncture of the coronal and sagittal sutures, over the zygomatic arch, under the chin, and pursuing the same direction on the opposite side, until he arrives at the back of the head; he then passes it obliquely around and parallel to the basis of the lower jaw over the chin, and continues the same course on the other side, until it ends where he commenced, and repeats.*

When the condyle is fractured, the external pterygoid muscle pulls it forwards, and it is by no means easy to apply such a force to the deeply-seated fragment as to bring it in contact with the body of the bone. Our only alternative is to press the lower portion as well as we can to the condyle, by placing a thick compress upon the angle of the jaw, and applying our bandages so as to press upon this part of the bone.

Compound fractures of the jaw are to be treated as similar injuries elsewhere. Every attention must be paid to insure cleanliness, contact, and rest of the parts, and constitutional symptoms are to be met by antiphlogistics, anodynes, and tonics, as cases may require.

DISLOCATIONS† OR LUXATIONS.

The forcing of articular surfaces out of their relative position is called a dislocation or luxation, or familiarly, putting

* Reese, Note Cooper's Surg. Dict.

† *Dis loco*, to get out of place.

out of place. These injuries require surgical aid, it being rarely possible for the patient to replace the bone by his own efforts.

The cause of dislocations is generally external violence, especially falls, but they may be occasioned by the sudden and violent contraction of muscles, and these latter are always more or less concerned both in effecting dislocation and repairing it.

Luxations may be *complete* or *incomplete*. They are complete when the articular surfaces no longer touch; incomplete, when they remain partially in contact.

They are necessarily attended with rupture or violent elongation of ligaments.

The symptoms of dislocation are pain and incapacity of the part, change of position and relation of the bones which form the joint, ascertained by the touch and by the position of the limb or part. Sometimes, also, special symptoms, indicating the pressure of bone upon sensitive or important parts, attest the nature of the injury.

Dislocations of the Lower Jaw.—From the latitude of motion enjoyed by the lower maxillary bone, and the necessary looseness of its articulation, it is very subject to dislocation, though this can only take place in one direction, forwardly, and not then unless the mouth be wide open and the chin depressed greatly at the moment of the injury.

Sometimes when parties are in high altercation, and one of them is vociferating loudly, a blow from the other, falling upon the expanded jaws, will put a stop to the flow of epithets or recital of grievances, by dislocating the submaxillary. Sometimes, also, after the jaw has been previously dislocated and the ligaments relaxed, yawning will be sufficient to bring the condyles to slide forward, and the ligaments giving way, to glide beneath the zygoma.

The injury has resulted from the use of great force in extracting a tooth, the jaw being much depressed at the same time that great force was exerted upon a posterior tooth, elevating and pulling forward the posterior part of the bone.

Dislocations of the jaw are very painful, owing to the pressure of the condyles upon the deep-seated temporal nerves, and those which go to the masseter, which nerves pass before the root of the zygomatic processes.—(Boyer.) The mouth is open and immovable, the patient speechless, the saliva running from the mouth, and the countenance expressing great distress and anxiety. If the dislocation be long continued, the jaws are more nearly approached than when the injury is recent. The coronoid process forms under the cheek bone a prominence which may be felt through the cheek or from within the mouth.*

Upon the whole, it is not easy to mistake the character of the injury.

Dentists should be aware of the possibility of such an accident as this when extracting a tooth, and should guard against such a position of the jaw as would be favourable to it. It may happen, however, even in the hands of the most skilful and prudent, and they should be prepared to reduce the dislocation immediately.

Mr. Fox dislocated the jaw of a patient on both sides, while endeavouring to extract a tooth for him.

The manner of replacement is very simple. The operator must first wrap his thumbs thickly with cloth of some kind, to protect them from injury. He must then place them as far back in his patient's mouth as he can, and while he depresses the posterior part of the jaw with them, he must elevate the chin with his palms and fingers. This process disengages the condyles from beneath the zygoma, when the muscles draw them into their place with considerable force enough to lacerate the thumbs of the surgeon, unless they have been well guarded against such an accident.

Sir Astley Cooper placed the patient in a recumbent posture, placed two corks between his molar teeth, and elevated the jaw.

* Cooper's Surg. Dict.

Efforts at reduction may be confined to one side, if one only be dislocated.

In order to prevent a redisplacement, the jaw should be supported for several days, by bandages similar to those employed for fracture of the lower jaw, and the patient should be warned against opening his mouth more than absolutely necessary for the reception of soft food.

CHAPTER XIX.

PARTICULAR AFFECTIONS OF THE MOUTH AND ADJACENT PARTS.

DISEASES OF THE GUMS.

OF inflammation of the gums I have already treated, in considering the general subject of inflammation. They are liable to other disorders which are worthy of notice. Among these are tumours, termed epulis* and parulis.† These tumours differ entirely in character. The parulis is an abscess, the result of suppurative inflammation; the epulis a true tumour or morbid growth, seated upon and involving the structure of the gum. Parulis is therefore a distension of the parts by injected blood and effused matter; epulis is an addition of organized but unhealthy substance, increasing the solid bulk of the parts.

The term epulis is applied to different excrescences seated upon the gum. Some are hard, even scirrhus; others soft and spongy. Some are developed in the gum itself, others have their seat in the membranes of the teeth, periosteum, or in the dense structures of the bones.

Of course, as they differ in character and seat, they can have no uniformity as to the inconvenience and danger attending them. They are generally caused by carious teeth, whose fangs keep up a continual irritation in the neighbouring parts, and are sometimes traceable to neglected *parulis* or gum boil as their immediate cause.

The most common form of epulis is that of a soft, red, spongy mass, which bleeds readily, but is not attended with much pain,

* Epulis—*επι*, upon, *ουλον*, the gum.

† Parulis—*παρ*, near, *ουλον*, the gum.

as it is not very sensitive. It is liable to be reproduced after removal, but, unless improperly treated, is not dangerous. Sometimes, instead of appearing externally, the disease commences in the sockets of the teeth, and loosens and displaces them, though they may be perfectly sound. Some swelling of the gums and a discharge of pus accompanies this condition.

A smooth, shining, elastic tumour sometimes shows itself upon the gum. It is compressible, but little sensitive, and bleeds freely if cut into. It is not malignant.

A scirrhus may be located in the gum, where it will exhibit its distinctive qualities, hardness, acute lancinating pain, and unequal surface. It follows the history of similar tumours elsewhere, and is much to be dreaded.

Another form of carcinomatous affection of the gums is that of a soft, spongy, bleeding fungus, much like the first form of epulis, but accompanied with great sensitiveness and acute pain.

When these affections, either in their natural progress or from ill treatment or injury, assume a rapidly progressive form, very terrible phenomena begin to manifest themselves. If previously hard they soften, the bones become carious, a fetid and sanious discharge is poured out, the teeth are loosened, the devastation spreads, the lymphatics swell, hectic supervenes, and after much severe suffering the patient expires, from nervous exhaustion, hemorrhage, or suffocation.

When the tumour is of the non-malignant kind, and has not so far progressed as to involve a large mass of bone in caries, and soft parts in ulceration, it may readily be removed, and its return be prevented, by the removal of the carious teeth which cause it, if, as is generally the case, it has been induced by this cause. Without removing these irritants, of course no permanent cure can be expected.

When of the malignant variety, the most prompt and decided means must be resorted to, to prevent fatal consequences.

Mr. Liston and Prof. Mütter both regard genuine cancer of the gums as a very rare disease; but they concur in thinking

that such affections are degenerations from original character, owing to constitutional causes, neglect, or bad treatment. There is, therefore, more encouragement to hope for success in the attempts made to remove these affections, than when they are but the local indications of general disorder.

The treatment will of course be modified by circumstances. If the disease be not malignant, but is evidently a mere fungous condition of the gums, depending upon the irritation of a carious tooth, &c., it is only necessary to remove the cause of the trouble, and then to cut away the tumour, and destroy what may remain of it by compression or caustic.

If the tumour be of the elastic kind, it must be thoroughly removed. If it hang by a narrow neck, it may be cut off by a ligature. Profuse bleeding is apt to result from incising these tumours, and will generally demand the use of the actual cautery for its suppression.

The scirrhus or malignant tumour requires a very thorough exsection. Every tooth and all the bony structures in any way connected with it must be boldly cut away, and the wound seared with the hot iron.

The mode of operation preferred by Prof. Mütter, and which he thinks "better adapted to the case," and fraught with less suffering than the use of the mallet and chisel, is thus described by himself.*

"Having placed the head of the patient in a good light, and against the chest of an assistant, who stands behind the operating chair, the surgeon makes a perpendicular incision on each side of the tumour, with a pair of strong scissors, or rather cutting forceps, and without stopping to arrest the hemorrhage, at once detaches the mass, by dividing the alveolar process *above* or *below* the tumour, as the upper or lower jaw happens to be involved, with cutting forceps, one blade of which is applied to the inner portion of the jaw, and the other to the outer. The raw surface is next carefully examined, and every vestige of the disease removed with a knife or scissors. If the bone

* Liston and Mütter's Surgery, p. 285.

appears affected, it must be cut away, and often a very good preventive to the return of the disease is the use of the actual cautery. The bleeding may be arrested, either by the cautery, or by placing a pledget of lint, dipped in creasote, in the chasm, over which a slice of cork may be laid, and then closing the jaws, make the sound one act as a compress. To secure the dressing, the bandage for fracture of the lower jaw may be applied. The parts should not be examined in the first twenty-four hours; but after this period a daily dressing is required, the nature of which depends on circumstances. If there be no disposition to a return of the disease, it will be sufficient to wash the part with some detergent solution, until cicatrization is completed. But if fungous granulations make their appearance, the vegetable caustic (caustic potassa), or actual cautery, should be applied, until this disposition in the wound is destroyed.

“Instead of using the perpendicular cuts with the short forceps, some prefer a thin saw, but the method just described is less painful, and accomplishes the object in a much shorter period. When the tumour is very large, the saw may be required, and should be always at hand, in case the edges of the forceps should turn in making the first cut.

“When the tumour is very large, or seated in the side of the bone, or far back, the cheek should be divided, in order to enable us to reach it without difficulty. In such cases I have found great advantage in using a cutting forceps, so curved as to pass readily to the back part of the mouth, and then allow of the blades being passed above the base of the tumour, when the upper jaw is affected, and below it, when the inferior maxillary is the seat of the disease.

“After the removal of the diseased mass, the wound of the cheek may be closed, and union by the first intention attempted; and when the dressings are carefully attended to, the deformity resulting from the incision is scarcely perceptible, unless the *portio dura* is extensively injured, when paralysis, generally incurable, ensues, often giving rise to a very unpleasant expression of countenance.”

Of whatever kind these tumours may be, they should be carefully watched. So long as they cause no inconvenience, they may be let alone, but if, by reason of growth or any other cause, they begin to inflame the surrounding parts, or to become painful during the movements of the jaw or contact with air or food, they should be extirpated. If pendulous and accessible, a ligature or the knife may be used ; but if broadly based and fully incorporated with the gum, and but small in size, caustic will be required.

A number of cases have been collected by Jourdain, and published in his celebrated work on the diseases of the mouth, which show the serious character often assumed by epulis. In truth, all forms of tumours may appear upon the gum, and the only difference to be observed in their treatment in this location, grows out of the impossibility of using applications and appliances which are found useful and convenient elsewhere. So far as tumours of the gums are concerned, the treatment is very limited indeed. If they contain matter, they must be opened ; if connected with carious teeth, these must be removed ; if with carious alveoli or maxillary bones, the treatment must be directed to the deep-seated cause ; if they are malignant, or if in any way inconvenient, they must be removed either by cautery, ligature, or incision, as the nature of the case may require.

Parulis.—Abscess of the gum is so called. It is precisely similar to such tumours in other soft parts, and generally, if not always, depends upon carious teeth.

Sometimes the abscess makes its appearance without preceding pain, over the fang of a diseased tooth, and after remaining for some time will gradually disappear, the matter it contains having been absorbed, or having found vent through an opening in the tooth. More commonly, however, the abscess succeeds a violent and protracted toothache, which is the consequence of cold acting upon the irritable nerves of carious teeth and bad-conditioned gums. The pain is sometimes very severe, but at all times there is an aching or throbbing sensation, due to the inflamed state of the gum tissue. Sometimes several

days and nights of severe suffering will elapse before the abscess is seen to elevate itself from the gum: at other times it will be formed in a few hours. When first perceived, it is a hard, circumscribed elevation, either immediately upon the gum or in the cellular tissue between the gum and cheek. After a longer or shorter time, the tumour softens, the pain abates, and fluctuation is perceived in the tumour. If no artificial means be employed to evacuate the matter, an opening will be made and the matter discharged. Sometimes, though very rarely, ulceration will perforate the cheek, and the pus be evacuated on the outside. This is an accident much to be deplored, and therefore, as soon as fluctuation is perceived between the gum and cheek, the pus should be evacuated.

During the inflammatory stage of the tumour, before pus is formed, little can be done except to apply leeches to it. These, if applied very early, will sometimes prevent suppuration, and more often limit its extent. After the tumour is fully formed, however, leeching will do no good. We can only soothe the patient by keeping the face warm, applying counter irritants to the cheek, and prescribing anodynes. Unless the diseased tooth be removed, the abscess will be formed again upon the slightest provocation.

Generally, after the evacuation of the pus, the abscess is filled with granulations, and the parts return to their natural state. Sometimes, however, the tumour is due to slow suppuration of the fang or alveolus, and in this case the matter continues to trickle through the opening, the edges of which become thickened and hard, and a fistula is formed.

Of course, the only remedy is to remove the diseased tooth or bone.

It not unfrequently happens that abscesses are formed at the roots of teeth which appear sound, and after much pain endured by the patient, fistulous openings evacuate the matter, which should have been discharged by extracting the tooth or teeth whose obscure disease produced and perpetuated the trouble. In illustration of this important fact, I will quote some cases reported by Jourdain.

"The late Mr. Desjardins, surgeon, requested me to visit with him M. Rosé, Place de Grève.

"This patient had been suffering for many days such violent pain along the whole extent of his chin, as to prevent him from sleeping at night or pursuing his business by day. As no disease could be discovered in his teeth, and as they were not at all subject to ache from cold or heat, they were not suspected to cause the suffering. The patient was bled, but without effect, and the pain becoming excessive, I was called in. I first examined the lower incisors, but could discover no signs of disease. The other teeth also appeared sound. The lower part of the gums of the incisors appeared slightly reddened, but without swelling or fluctuation. A little purple exanthema upon the right gum was the only additional alteration that we could perceive, and this was not sufficient to determine the extraction of the tooth.

"Thus uncertain how to act, I applied a lighted taper to these two teeth. From the reflection of the light, we satisfied ourselves that the incisor tooth nearest to the canine was the cause of all the suffering. The enamel substance seemed to have lost its usual transparency. Finally, to be more certain, I pierced the exanthema, and serous blood flowed out. The stilet pierced the bone and struck the root of the tooth, which I extracted. We immediately broke it. The canal of the root and the pulp-cavity were filled with a black and very fetid pus.

"Upon the same day, the patient became entirely easy, and in a few days no appearance of disease remained."

"FISTULA OF THE GUM OF THE LOWER MAXILLARY, HAVING AN EXTERIOR OPENING AT THE HOLLOW OF THE CHIN.

"M. A. Petit called me to see the wife of M. Despinasse, whom he had been treating for a long time for a fistula of the gum, situated at the lower part of the gums of the two central incisors of the lower jaw, and which had an external opening upon the fossa of the chin. The teeth were neither loose nor altered in colour.

"The patient could give no reason for the occurrence of the

disease. She looked very well, and was yet young. The ulcer gave us no clue to the cause of it. The condition of the teeth made us hesitate to extract them from the mouth of so young a woman, and the same reason had hitherto prevented such an operation.

“Various caustics had been introduced into the external opening. In short, with the exception of the actual cautery, no means had been left untried to heal the fistula. The opening of the gum had indeed cicatrized, but that of the chin had proved intractable.

“Upon exploring the outer opening, I found that the probe penetrated the base of the alveolar and maxillary substance, and that these bones were traversed by little canals corresponding to the roots of the two teeth. Hence, considering the length of time that the disease had resisted all remedies, I strongly suspected that the alveolar extremities of these roots were carious. I imparted my suspicion to M. Petit, who agreed with me that the teeth should be extracted. When the teeth were drawn, I examined them. The extremities of their roots were black and corroded; the canal was in the same condition, and the pulp-cavity contained thick and fetid pus. Suitable treatment was now addressed to the carious bones, and the fistulas soon were healed.”

SPONGY OR FUNGOID INFLAMMATION OF THE GUMS.

This affection is commonly called scurvy, but improperly so, as we have already observed.

The gums, when thus affected, are darker than usual, swollen and less firm than when in health. They bleed freely under the brush, or when touched by the lancet, and upon pressure, discharge a very fetid pus, which often gives its disgusting odour to the breath.

The gums are generally detached to some extent from the teeth, and their margins are thickened. They are often very sensitive.

The extent of the disease, and the inconveniences attending it, vary very much. Sometimes it is confined to a very small

portion of the gum, being a mere local attendant upon some diseased or irregular tooth, at other times it seems to depend upon constitutional causes, and communicates itself rapidly to the whole gum structures of the mouth.

When thus extensive, it developes disease in the periosteum of the teeth, causes bone to be deposited in the sockets, spreads carious devastation along the whole circle of the jaws, and despoils the mouth, either by causing the teeth to be pushed from their sockets, or by destroying the crowns by devastating caries.

In the meanwhile the general health suffers. The fluids of the mouth are no longer fit to perform their office; the teeth cannot masticate the food; fetid pus and blood trickle into the stomach, and the patient's nervous system is worn out by frequent paroxysms of toothache.

Though certain aptitudes of constitution give virulence to this affection, it is mainly a local disorder, originating from the presence of decayed teeth and tartar. The latter, gradually detaching the gum from the teeth, produces inflammation and ulceration of the gum, and accumulating under the opening, constantly increases the irritation.

Dr. Harris mentions a form of this disease met with in persons of scrofulous habits, which he thinks differs essentially from the more common affection. In this case, "the gums, instead of being purple and swollen, are paler and harder than ordinary, and on being pressed exude a muco-purulent matter of a dingy white colour. They often remain in this condition for years, without appearing to suffer any loss of substance, or to affect the alveolar processes. This variety of disease of the gums is principally confined to persons who have very white teeth, and is much less likely to affect males than females. It rarely occurs before the age of eighteen or twenty, and though unquestionably the result of inflammation, yet the gums exhibit no inflammatory symptoms, but on the contrary are paler, less sensible, and possessed of less warmth than usual. It is never attended with tumefaction of the gums, and by absorption only in its advanced stages. Its effects are the most sim-

ple and innocent of any form of disease to which the gums are liable, but its cure is generally more difficult."

The treatment of the common form of the affection is simple and generally successful, yet it is often comprehensive. Every irritant to the gum, whether tartar or teeth, must be thoroughly removed. This remark applies not only to diseased but even to irregular teeth, and to those which have no antagonists. This work of purgation of the mouth being thoroughly done, simple astringent washes will do all that is further necessary.

The scrofulous form of the disorder described by Dr. Harris, demands entirely different management. Being but a phenomenon of general constitutional vitiation, it can hardly be permanently relieved by local treatment. Constitutional remedies, such as proper diet, exercise, air and clothing, iodine and cod-liver oil, should be prescribed. At the same time the edges of the gum should be touched with lunar caustic (nitrate of silver), which not only acts as an escharotic by removing the diseased surface, but exerts a singularly modifying influence upon certain forms of inflammation.

HEMORRHAGE FROM THE GUMS.

The gums, like other mucous structures, are sometimes so engorged with blood, that it is exuded freely upon the surface, constituting *passive* hemorrhage. The pathological condition attending this sort of bleeding is very different from that which is manifested by *active* hemorrhage. In the former case, the exudation of blood is caused by the weakness of the containing tissues; in the latter, by the violence of vascular action. To relieve the one, we endeavour to fortify the parts by astringents, &c.; to check the other, we lessen the arterial force by which the blood is injected into the distended vessels. Hemorrhage of either kind may be due to the rupture of a vessel. This, however, is not necessary to hemorrhage, even when profuse. It is much more apt to be the case in active than in passive bleeding.

The hemorrhage from the gums is always *passive*. Even when the tissues are the seat of violent inflammation, they do not bleed, but when they are softened and rendered less resisting by local or constitutional causes, they sometimes permit the blood to exude through them to an alarming amount.

When the mucous membrane of the gums is thus hemorrhagic, the condition is shared by the membrane covering other parts of the mouth.

I have seen this affection as one of the phenomena attending exhaustion from intemperance.

Occasionally persons are met with, who manifest the hemorrhagic diathesis as an organic idiosyncrasy. In such cases all wounds are exceedingly dangerous, as the blood has too little coagulability to form a plug to any divided vessel. Instances have occurred, in which persons thus conditioned have bled to death from the rupture of trifling vessels in the extraction of a tooth.

When passive hemorrhage occurs from the gums, astringents generally fail to check it. Indeed it is almost impossible to apply them effectually to every part of the bleeding surface.

We have, however, a very available remedy in compression, which can be speedily and easily applied, by filling a wax holder, such as is employed for taking impressions of the mouth, with wax, previously softened in warm water, and then applying it in such a manner as completely to imbed the teeth and gums in it. This method, recommended by Dr. O. Holmes, I have seen tried successfully in a very obstinate and dangerous case.

When troublesome bleeding results from the extraction of a tooth, it may be checked by the actual cautery, or by plugging the tooth with a cone of waxed cloth or cork.

The nitrate of silver will commonly arrest the hemorrhage promptly; but it cannot be safely applied over a very large extent of the mouth at once.

CHAPTER XX.

DISEASES OF THE LIPS.

HARE-LIP.

THIS is a congenital deformity, which consists in a fissure which divides the lip perpendicularly. Sometimes there are two fissures; the former is single, the latter double hare-lip.

The cause of the deformity is unknown. It is a failure of nature, through an inscrutable cause, to complete the union of the two sides of the body at this part of the line of junction.

Sometimes the affection exhibits a single slit, at others two, with a lobe or flap between them; and sometimes the fissure extends along the roof of the mouth, the soft and hard palate being separated. Generally the lip on both sides of the fissure is not adherent to the alveolus, but sometimes it is.

Most commonly the upper lip only is affected, but sometimes the lower is the seat of the fissure. When this is the case, the child cannot suck, or learn to speak with any distinctness; adults suffer from the loss of the saliva, which runs freely from the mouth, and indigestion is the consequence. This form of hare-lip is seldom congenital, but is occasionally traumatic* or accidental.

All degrees of hare-lip are attended with deformity and inconvenience, though some, from the extent of the separation of parts, are much more annoying and unsightly than others. Mr. Cooper describes a form of it, which must, however, be rare, in which "the jaw is not only imperfectly ossified in front, so that a cleft presents itself there, but one side of it projects for-

* Traumatic—the effect of a wound.

ward, and is at the same time inclined too much outward, drawing with it the corresponding part of the palate and the septum nasi, so that a very unsightly distortion of the nostril and nose is produced."

When the fissure pervades the palate, the patient finds it very difficult to masticate or swallow, and articulation is necessarily very imperfect.

It is obvious that surgical aid must be employed for the remedy of the deformity.

A considerable difference of opinion exists among eminent surgeons as to the proper time for performing the operation—some advising to delay it until the child shall be four or five years old, and others preferring to operate upon the infant of months.

Sir Astley Cooper used to narrate several cases in which a fatal termination resulted from too early an operation—convulsions having occurred from the pain and irritation of the wound.

Undoubtedly, infants may often be operated upon with more facility than older children, and in some instances the deformity is attended with so much inconvenience as to authorize early operations. If, however, the child be able to nurse, and especially if it exhibit considerable nervous mobility, it will be better to delay the operation for several years.

Mr. Liston advises to defer the operation until the first dentition shall have been completed. He says, "when the operation is undertaken at an earlier period, there is often great difficulty. Sometimes union does not take place, the parts turn out again, and the patient is rendered more deformed than in the first instance. When the features are enlarged somewhat, you have more ground to work upon; you can put the parts neatly together, and you can almost answer positively for the union taking place."

The cure depends upon the capability of two incised surfaces to unite when brought into contact, and the proper performance of the operation consists in cutting off the edges of

the fissure, and keeping the new surfaces so closely together as to procure union by the first intention.

The manner of performing the operation is sufficiently simple, yet it requires considerable dexterity to do it well.

Some surgeons cut off the edges with a pair of strong sharp scissors; others place a piece of wood under the lip, and then pare off the edges with a knife; others, confident in the correctness of their eye and the steadiness of their hand, place the child between their knees, with the head towards them, enter the knife into the lip above the angle of the fissure, and carry it downwards until it completes the removal of all the portion of the lip on that side which is required. A similar cut upon the other side prepares the wound for closure.

The bleeding readily stops upon pressure of the lips, and is rarely excessive.

The wound is closed by the *twisted suture*; that is, two silver pins, with steel points, are introduced through the edges of the wound, penetrating the lip through about two-thirds of its thickness, the first near the inferior extremity of the wound, and the second a quarter of an inch above. The divided surfaces being thus brought into contact, thread is wound repeatedly around the pins, first transversely and then obliquely, from the right side of the upper to the left of the lower, and *vice versa*, until the contact is firmly secured. The points of the pins should then be unscrewed, and a dossil of lint placed under each end of them. The pins should be somewhat curved and flattened. Some surgeons prefer the ordinary interrupted suture.

Different bandages have been devised for the purpose of supporting the pins and preventing the separation of the adapted surfaces. That recommended by Mr. S. Cooper is used as follows: A close strong night-cap is provided, with a piece of broad tape attached to the back part of it, and with two ends of sufficient and equal length. A compress is then to be laid over one cheek, and fitted by bringing one portion of the tape forward over it, which is to be fastened to the cap on the opposite side of the head. The other compress is then

to be applied and fixed in a similar manner. Lastly, a bandage is to be put under the chin, and brought over each compress up to the top of the head, where the ends of it are to be fastened to the cap. During all these proceedings, until the compresses are well secured, the assistant must support them steadily with his hands. Lastly, the bandage, compresses, and cap should all be securely stitched together.

The cut through the lip must be as straight and clear as possible, and the operator need not fear to take sufficient of the edge to insure such a surface as will be well coaptated.

When the hare-lip is double, the older surgeons advised to perform the operation on one side and then upon the other; but this is unnecessary. The edges may be prepared at once, and the needles pushed entirely across through the intermediate flap. Sometimes a piece of bone projects and pushes out the flap. If so, the bony projection must be either reduced by compression or cut off. It is always important to save the alveolus, and it appears from the practice of Desault and Mr. Dunn, that it is seldom necessary to remove it.

There is often a deficiency of bone, which will cause deformity after the hare-lip has been successfully treated.

Very often, when the fissure extends along the palate, it will be approximated after the closure of the lip; but this is not always the case, and articulation and mastication continue to be very much interfered with by this unfortunate cleft of the palate.

The dentist can often remedy this serious deformity, by nicely adapting a gold plate, so as to form a solid artificial palate, which will tolerably well supply the want of the natural one; and this may be considered the most available means of relief at our disposal.

Operations have frequently been performed for the cure of this palatine fissure, and sometimes have succeeded. The operation, however, is difficult, very painful, considerably dangerous, and very uncertain, and should never be performed except by a dexterous and experienced surgeon, and under circumstances in which no artificial means could be used to cover the

cleft. The design of the operation is precisely the same as in the case of that for hare-lip, viz., to cut off the edges of the fissure and unite them by sutures so as to procure union.

The lips being very vascular, abundantly supplied with muscles, mucous glands, and nerves, are liable to become the seat of ulcers and tumours of various kinds. In the male, carcinoma of the lip is perhaps more frequently met with than it is in any other part of the body.

It is not necessary to particularize these affections, nor to give a detailed account of their phenomena and treatment. They must of course be managed as similar conditions elsewhere, the treatment being modified to suit the exigencies of the particular case, and the peculiarities of the location. All operations upon these organs must be conducted with great carefulness and nicety, on account of their sensitiveness and vascularity, and of the deformity and serious inconvenience attending any permanent alteration of their relations or structure. Of these, *adhesion to the gums* and *contraction of the lips* are the most common and most serious.

Adhesion is the result of acute inflammation of the surface membrane of the lip and gum, in the course of which plastic lymph is thrown out, and becoming organized, forms a permanent bond of union between the parts. In all cases of abrasion of these surfaces, or of long-continued inflammation, care should be taken to prevent this accident. It can rarely happen, unless the parts thus prepared to unite be pressed together by a bandage or some similar mechanical application.

I have seen it, however, result from salivation of a very severe grade. The cheek, from its less mobility, is more liable to this accident than the lips.

Contraction of the mouth may result from a burn, as may also adhesion of the lips to the gums.

When so serious a deformity has occurred, it can only be remedied by an ingenious operation, which, though very painful, is generally endured with cheerfulness, so terrible is the sense of deformity to most persons, especially to females.

A few cases will be sufficient to show what has been, and

what may be done, in unfortunate cases of this kind, and will furnish to the ready mind a number of valuable suggestions.

Simple dilatation of the mouth will be unsuccessful, and incision at the commissures will be ineffectual in permanently enlarging the orifice, on account of the impracticability of preventing reunion between the severed portions of the skin.

In order to obviate this difficulty, the celebrated Dieffenbach, who has deservedly obtained a world-wide reputation for his success in rhinoplastic* surgery, suggested that a strip of mucous membrane should be folded over the edge of the incision. This fortunate thought has led to a number of brilliant and successful operations for the cure of this class of deformities. The following cases are specimens :

M. H., aged twenty-two, admitted to the hospital under Mr. Liston. About a year before, she was knocked down in a brawl, and a man jumped upon her, lacerating and bruising her cheek and mouth very extensively, and fracturing her jaw. She went to St. Thomas's Hospital, where her jaw was put up and bandaged. These were not removed for some time, and when taken off, the wound on the right side of the mouth was found to be healed, and the cicatrix considerably contracted. Since then the contraction has continued somewhat, and now the mouth is so small that she can scarcely get any solid food to pass her lips. There is a large and dense white cicatrix on the right side of the mouth, rather sharp and puckered toward the angle.

Mr. Liston removed a triangular portion of the cicatrix on the right side of the mouth, dissecting it off the mucous membrane, which was then divided to the extent of the external wound. Lint, dipped in cold water, was then laid over the surface, to suppress the oozing of blood, which was by no means considerable. About five hours after the operation, all oozing having ceased, the mucous membrane was turned over the cut edge of the cicatrix, and united by three or four points of su-

* Rhinoplastic—literally, *nose-making* : a term first applied to the operation for making a substitute for a lost nose, but now applied to all operations for restoring lost parts.

ture to the skin of the cheek ; by this means, a mucous surface was secured to the newly formed prolabium, and the gradual cicatrization and consequent contraction avoided. On the day after the operation, there was a little swelling around the wound, not much pain, and in ten days afterwards the patient was discharged much relieved.

CASE II.—The daughter of a highly respectable physician, when she was eleven years old, was accidentally thrust against a heated stove, and her hands, arms, neck, and the lower part of her face severely burned.

In spite of all the judicious means employed by the father, the wounds about the mouth healed with so much contraction that the opening into that cavity was almost obliterated. Her father then endeavoured to distend the mouth by tents, but these accomplished nothing. He then endeavoured to enlarge the orifice, by making a horizontal incision from each angle of the mouth, and preventing the surfaces from uniting, by the interposition of tents ; but this expedient failed also.

The patient was then brought to Dr. Mütter, who says:

“When I first saw her, nearly a year had elapsed since the occurrence of the accident. Her appearance at this time was very singular. Firm and dense cicatrices nearly surrounded the mouth, but were most marked on the lower lip and about the angles ; while the orifice of this cavity was barely large enough to admit the point of the finger, and presented an oval form. The cicatrices of the incision made by her father were also very apparent at each angle. The general health was good.”

Dr. Mütter performed upon this young lady the operation as proposed by Dieffenbach.

“The patient was seated in a low chair, with her head supported by her father, and exposed to a good light. I then introduced the extremity of the fore-finger of my left hand into the mouth, and placed it under the left labial angle, which by this means was rendered prominent and sufficiently firm to permit the second step of the operation to be readily executed.

“This is accomplished by the introduction of one blade of a

pair of narrow straight scissors into the substance of the cheek, between the mucous membrane and the other tissues, and a little above the commissure. The blade is then slowly pushed from before backwards, separating, as it passes along, the mucous membrane from the muscles and integuments, until its point reaches the spot at which we wish to locate the new angle of the lips. The blades are then closed, and the parts included between them cut squarely and smoothly at a single stroke. The first incision being completed, the scissors were withdrawn, and a second one, parallel and similar to the first, made in the lower lip, the distance between the two being about three lines. These incisions were then united at their posterior termination by a small crescentic section.

“By these cuts it is evident that a small strip of muscle and integument was insulated from the surrounding parts, and it only remained to separate it from the buccal mucous membrane, which was easily done by a single stroke of the scissors.

“The second step of the operation being thus finished on the left side, similar incisions were performed on the right.

“The next steps of the operation, and by far the most difficult of the whole, were the division into equal portions of the mucous membrane, the eversion of the flaps, and their attachment to the edges of the incisions just made, as well as to the red pellicle of each margin of the lips.

“To divide the mucous membrane equally, I separated the jaws of the child as much as possible, by which measure the membrane was put upon the stretch, and kept sufficiently firm to bear the operation of the scissors. The incisions in the membrane did not extend as far as those made in the muscles and skin, but stopped short about three lines from the union of the latter. This was done in order to make the outer portion of this tissue adapt itself accurately to the new commissure. The flaps were then brought out, reflected over the margins of the wounds, and firmly attached to them by means of the twisted suture, the needles used being very short and fine. The membrane must be first attached to the commissure, by which

measure we secure the proper adaptation of the flaps to the other parts.

"Everything being thus properly adjusted, a common roller bandage was applied, as in cases of fracture of the lower jaw, in order to prevent any derangement of the wounds. The patient was then placed in bed, with her head elevated, and as she had, just before the operation, eaten freely of some light food, ordered to take no nourishment of any kind until the next visit, and to be perfectly silent."

Four days after the operation the bandage was removed, and the Doctor proceeds: "The sutures, which had been closely bound down to the parts by blood, were carefully softened with warm water and cut away. As soon as they were removed, the most gratifying exhibition of the success of the operation was afforded. On both sides, union between the everted mucous membrane and the margins of the wounds had taken place nearly throughout, and the new lips presented an appearance almost natural. Some of the needles were then removed, but as there appeared to be a feebleness in the adhesions at some points, the needles passing through them were allowed to remain, and a thread cast loosely around them. The bandage around the head was also reapplied.

"Nothing remarkable occurred in the subsequent treatment. The dressings were taken off in eighteen days. The mouth presented a very good appearance, though the lips were somewhat thinner than natural, and there was some difficulty in bringing them into close contact, especially at the central portions. I have no doubt, however, but that this defect will soon disappear."

An operation of a similar kind, but much more difficult, performed by Dr. Hullihen, will be described in a subsequent chapter.

The following cases of cancer in the lip, and operations for the removal of the diseased portion, as published in the Boston Med. and Surg. Journal, by Dr. Gilman Kimball, of Lowell, are worthy of preservation as examples for the young surgeon:

"Cancer of the lip being so common a disease, and one that

so frequently besets the surgeon with embarrassment in determining what is best to be done under certain circumstances, the following cases are given with a view of showing that there are those of, apparently, the most unpromising character, where surgical skill may be made available, not only for the absolute removal of the disease, but in such manner as to subject the patient to a very inconsiderable degree of deformity.

“John Cassidy, eighty years of age, with good constitution and temperate habits, discovered, some eight years since, a small, hard tumour, the size of a pea, on the middle of the border of the lower lip. Unattended with pain or other inconvenience, and remaining stationary, as to size, for several years, it gave no inconvenience, and received little or no attention.

“Two years since, it began slowly to increase in size, and for the last six months previous to its removal, its growth was very rapid. Early in April, he came under my charge. At this time the disease involved the entire lip, embracing its whole free border from one angle of the mouth to the other, and descending down very nearly to the chin. It was now excessively painful, discharging abundantly, and very offensive. An operation was suggested and cheerfully submitted to without delay.

“The whole lip, with so much of the contiguous parts as was likely to be at all affected with the disease, was, in the first place, cut clean away. This was done by making two vertical incisions through the lip, one from each angle of the mouth down to nearly the base of the jaw, and another, horizontal one, running below the disease, and uniting the first two by their lower extremities. This part of the operation left a quadrangular space, which it was the design to fill up with parts supplied from the cheeks. With this view, two horizontal incisions were next made through the cheeks, running back from each commissure to the extent of an inch and a half; and then again, two more, of the same extent, running parallel with the base of the jaw, and continuous with the horizontal incision first made for the removal of the lip. A slight dissection was sufficient to detach

these parts from their connexion with the jaw, thus affording two ample and properly-shaped flaps. These were now drawn forward, with slight force, and, by means of three twisted sutures, secured to each other on the median line. Several other sutures were used, here and there, for the sake of preserving a proper adjustment of the parts, and particularly at the commissure, with a view of leaving the mouth, as nearly as possible, with its natural width. The mucous membrane was, likewise, drawn over from the inner edge of the newly-formed lip, and attached to the skin on its outer edge. The dressings were very simple, consisting, merely, of narrow strips of thin linen, six inches in length, passing across the lip and chin from one cheek to the other, and secured thereon by means of collodion.

“With regard to the subsequent treatment of this case, it is sufficient to say that, on the third day, the outer dressings were removed for the first time, also one of the twisted sutures. On the fourth day they were again removed, together with the two remaining sutures. At this time it was evident that union by the first intention, had taken place in every part of the wound, and nothing further remained to be done, but to keep the parts covered with the collodion dressing for about a week longer, and then to be discontinued altogether.

“The healing of the border of the new lip was somewhat protracted, and was not complete till the end of the third week. The stitches which had been used in the first place, for bringing together its outer and inner edges, all gave way in less than forty-eight hours; so that in the end, they seemed to have done quite as much harm as good.

“It is now fourteen weeks since the operation, and the patient is, in all respects, quite well. His general health is greatly improved, and there is, as yet, no evidence of a return of the local disease.

“Another case, similar in character to the above, has since come under my charge, and, though much less in extent, has been operated on after the same method, and with an equally satisfactory result.

“The patient, a maiden lady seventy-eight years of age, of excellent health and constitution, first discovered the disease, on her under lip, about two years since. At first, not larger than a small-sized pea, without pain or soreness, it remained stationary, as to size, till within a short time since, when it began rapidly to increase, and at times to be attended with pain. The disease had not yet descended below the free portion of the lip, but involved something more than half its border. It was a case where the V incision might have been adopted, and the wound brought together so as, *possibly*, to have effected an immediate union. In such a case, however, more or less deformity would, necessarily, have ensued, so that the plan pursued in the case already described, was thought preferable, not only as offering the best chance of securing a perfect and immediate union of the parts, but also of avoiding, more certainly, the probabilities of any considerable disfiguration.

“The disease was, at first, removed by making three straight incisions through the lip, and encroaching, at the same time, somewhat freely upon the adjoining sound parts. The portion thus removed was trapezoidal in shape, and embraced considerably more than one-half the entire lip. Flaps were next made after the same manner as in the previously described case, viz., by prolonging the horizontal incision, on either side, to the extent of three-fourths of an inch; also, by extending backward an incision of the same extent from each commissure of the mouth. The parts were now readily drawn together, without force, and secured on the median line by twisted sutures. The same dressings as in the former case were adopted, viz., strips of fine linen nicely laid on, and coated over with collodion; and, finally, the whole overlaid with a thin compress moistened with cold water.

“The subsequent treatment was very simple. The first dressings were allowed to remain undisturbed till the third day, and then they were entirely removed, sutures and all. The most perfect and exact union was found already to have taken place in every part, yet, as a matter of safety, the collodion application

was resumed, from time to time, for several days longer, when all dressings were permanently discontinued.

“In this case, though the disease, as has been already shown, was comparatively limited, the propriety as well as success of the method adopted for its removal, has been as satisfactorily illustrated as in the preceding case. Not only has there been no deformity produced by the operation, but even the traces of it would scarcely be noticed, except by more than casual observation; and, in consideration of the liberal amount of apparently sound tissue cut away in connexion with the disease, also the previously healthy condition of the patient, it is, perhaps, reasonable to believe the malady will never return.

“Aside from the interest that attaches to the above cases, merely, as successful results in two consecutive operations for the same disease, the more important object in furnishing these details, has been to exhibit a method of procedure* which, though not singular, has, at least, the merit of simplicity in its favour, at the same time that it fulfils, most satisfactorily, every purpose for which it was intended. It may serve, moreover, to relieve, in some measure, the difficulty which a surgeon sometimes feels, when he comes to determine, among the variety of operations recommended for a given object, which, upon the whole, it is most expedient to adopt.”

* The idea of making a new lip from material furnished from the cheeks, appears to have been first suggested, if not practised, by M. Malgaigne. The operation itself, however, as described in the details of these two cases, has been successfully performed within the year past, both by Dr. Post and Dr. Buck, of the New York Hospital.

CHAPTER XXI.

DISEASES OF THE GLANDS AND GLAND-DUCTS.

SALIVARY TUMOURS.

Ranula.*—This is the name given to a tumour under the tongue, which is caused by obstruction of the ducts of the sublingual gland, and the detention of secretion which consequently results.

This swelling is not usually very large, though sufficiently so to cause great inconvenience; but occasionally it has been observed of an enormous size. Le Clerc mentions a case in which the tumour filled the whole mouth, and pushed forward the teeth of both jaws. The patient was nearly suffocated, and must have died had he not been relieved by an operation.

The case related by Boinet to the French Academy, was even worse. The swelling not only filled the whole mouth, but projected out of it for a considerable distance. The two upper incisor teeth on the left side, were lodged in a depression observable there, and the canine teeth of the same side, forced outwards by the mass of the disease, had pierced the lip near the commissure. A fluid, resembling mucus, flowed from a narrow aperture at the lower part of the swelling. The tongue could not be seen, so much was it pushed backwards, and for some time the patient had subsisted only upon liquid food, which he was first obliged to convey to the back of his throat by some mechanical contrivance. The four incisor teeth, two canines, and first molars, of the lower jaw, had been pushed out

* *Rana*, a frog; so called from a fancied resemblance.

of their sockets by the pressure of the swelling. The patient's aspect was alarming, and he was threatened with suffocation.

Extirpation was thought necessary, and it was performed with all due caution. The large cavity thus occasioned was filled with lint. The lower jaw being diseased, Boinet scraped some of its surface off, and covered the places with lint, either dry or dipped in spirit of wine. Some exfoliations followed, and the fungous granulations which grew were suppressed with proper applications. In three months the cure was completed.*

Ranula may readily be detected. It presents itself in the form of a rounded or oval, soft, semi-transparent tumour, on one or both sides of the frænum linguæ. It is not painful, and occasions little inconvenience until its volume becomes sufficiently great to interfere with the movements of the tongue.

Nevertheless, encysted tumours of various kinds do sometimes occur in this locality, and have frequently been mistaken for ranula.

Simply to open the tumour and let out the fluid contents, will not cure the disease, inasmuch as the obstruction of the ducts will continue. It becomes necessary, therefore, to reopen these, or, if this cannot be done, to make an artificial opening, which may permit the secretion of the gland to escape.

Lewis advised the introduction of small leaden stilets to dilate the canal, and permitting them to remain for a day or two at a time. Dr. Physick and others preferred the passage of a thread through the tumour, which was permitted to remain as a seton. Dr. Reese considers this plan infallible, or nearly so.

The method pursued by Lewis, and followed by Dr. Mütter, is to make an oval or round incision, and then to touch the margin with nitrate of silver, so as to create an artificial fistula.

Sometimes all other means fail, and it is necessary to dissect out the whole tumid mass.

The salivary glands are sometimes the seat of tumours of a

* Cooper's Surg. Dict., Art. Ranula.

more formidable character. Being enclosed, the sublingual gland especially, by the muscles of the throat and tongue, these tumours, even if suppuration takes place, cannot commonly be relieved by the discharge of the contained matter. The sac may be repeatedly punctured without relief, for the fluid continues to form, and repeated wounds result in thickening and enlargement of the gland, and finally a solid tumour is formed, which may go on to enlarge until it may cause suffocation.

The case of Margaret Murray, so graphically related by Mr. John Bell, should warn us against trifling with even apparently trivial tumours of these parts, and dentists, as they may be the first to observe, should be prepared to distinguish these swellings, and advise that prompt and decided treatment which is so important in these cases. In the case of Margaret Murray, the tumour was as large as the patient's head, and threatened imminent suffocation. In fact, the poor woman lived in a state of semi-strangulation. When upon the verge of gangrene, the tumour, which was hard upon the surface but fluctuating beneath, was transfixed with a trocar. About two pounds of thick ropy matter were discharged. It was hoped that this discharge would afford relief; but, as Mr. Bell very justly observes, those who indulged such an expectation did not recollect that to produce a secretion so profuse, a great mass of vascular substance is required, and the consequence of permitting a gelatinous collection of matter to attain to such a size is, that the vessels by which it is secreted, not being, as in a case of suppuration, ulcerated or destroyed, the basis, consisting of these vessels, is consolidated into a tumour. The sac may be emptied, but the nucleus to the sac cannot be discussed, but hardens and inflames *pari passu* with the evacuations.

In the case of this poor woman, though the salivary matter continued to run, thin and pellucid, through the opening, the tumour did not diminish. "She lay reclined, always struggling for breath, and sometimes attacked with violent asthmatic paroxysms; the jaws almost entirely closed, the mouth continually open; the nostrils dilated, and the stupor, which such difficulty of breathing causes, increasing every moment; and

her swallowing being equally difficult with her breathing, she expired in the fourth week."

Although tumours of this kind may contain thin matter, a mere puncture is not sufficient for their relief. A free incision must be made, laying open the diseased gland, and the treatment directed to the permanent adhesion of the walls of the sac. The sooner this is done the better.

TUMOURS OF THE SUBMAXILLARY GLAND.

This gland is very subject to inflammatory swellings, which frequently become indolent, and remain for a long time without causing inconvenience. Occasionally, however, it is the seat of very dangerous and even fatal tumours.

Mr. John Bell records the case of "Jenny Brown, a poor solitary thing, who worked laboriously to maintain her aged mother, her father being for some years dead. She slaved at all kinds of work, as an out-servant in a farm-yard. After churning milk, being exceedingly heated, she went out with her cap loose and her jaws exposed, and by carrying bundles of wet grass for the cows upon her head, had a severe tooth-ache, for which a tooth was pulled; and still continuing in the same labour, she got cold. Thence arose a kernel-like swelling of a gland under the lower jaw, near the gum of the corrupted tooth. Her face was swelled so that her eyes were closed; the lump grew as big as a hen's egg, with severe pain; the swelling of the face subsided, the pain ceased, but the glandular tumour remained. Such was the slight beginning of the disease." The tumour, however, continued to enlarge until it became necessary to extirpate it. This was attempted in an awkward and irresolute way, and abandoned in the midst of the operation. "One advantage this poor creature derived from this unsuccessful operation, viz. the relief from pain, for she was relieved by the loss of blood, insomuch that she recovered her health, and in some degree her strength, and returned to work for the support of her old mother: at least she could spin. For a long time she has been unequal even to

this. She has lingered and wasted in a very helpless condition, and is now in a state of extreme weakness from want of food. She walks but a few paces without stopping for want of breath; her swallowing is difficult; she has great pain, night and day, from the mere distension and size of the tumour. The weight of it is intolerable, and it appears to me that in not many weeks she must be relieved from her sufferings."

The suffering of the patient seemed to be occasioned by the great bulk of the tumour pressing upon the trachea, and even the breast, and embarrassing respiration. The tumour had every character of what is usually called a wen; the whole mass incredibly heavy in proportion to its bulk, so that she supported it continually with a sling round the head and neck. It was extremely firm, not very vascular throughout its substance, but receiving its arteries at particular points. It had no great veins running over its surface, whence Mr. Bell presumed that it had nothing of a cancerous character or irritated circulation.

Mr. Bell wished to operate, but was overruled.

Some remarks of Mr. Bell, in lecturing upon these subjects, are so judicious, that I cannot refrain from quoting his language at some length.

"But it is not the discussing of interesting doubts and questions of life and death, nor the performing operations within the limits of possible success or possible safety, that constitute the chief occupation of one engaged in practice. The more homely talent of distinguishing the various aspects and characters of tumours, and treating them judiciously, is far more desirable to acquire; and, indeed, there is a very perplexing variety of tumours within the mouth and around the jaws, which one learns to distinguish only by referring their various aspects to corresponding peculiarities in the structure of the parts. The tumours which I have just described are of a very malignant character, and I confess I know not whether to refer them to the salivary or the lymphatic glands; to the latter, rather, I believe. This, for example, of Mr. M., though it looks like a tumour of the submaxillary gland, which holds embedded, I may say, in its substance, the facial artery, could not have

been extirpated without dividing that artery. The submaxillary gland is divided into two masses, and the trunk of this artery is received into the recess or cleft. The artery seems to twist round the gland, and I have, both in extirpating the submaxillary gland and in assisting at such operations, recognised it by this mark.

“The following case, if not full of interesting particulars, is at least accompanied with useful rules, and I transcribe it from my case-book, with those reflections which arose in my mind when forming my opinion and preparing for the operation, as I have ever done, with a scrupulous and conscientious desire to foresee every eventual danger, and recollect every circumstance, anatomical or pathological, which might contribute to my patient’s good; the reflections, you will perceive, have a mutual relation to the instruction of my pupils and my own improvement.

“It is the case of a young lady, who came from a very great distance, urged by her own fears and the persuasion of her surgeon.

“First, I observe that the gland affected seems to be the very gland which, after an unsuccessful operation, grew to so immense a size in the case of Jenny Brown, and in her, though the tumour arose from the slightest and most accidental cause (extraction of a tooth), without any cancerous diathesis, or other malignant tendency, it proved fatal by suffocation. What might have become of *this* lady, it is easy to foresee, had she not been warned by her surgeon, and alarmed by the recent accession of pain, for her own safety.

“Secondly, when we are consulted what is to be done in any particular case, we are, in other terms, called on to prognosticate what will be the patient’s condition at the distance of one or two years. In the present case, the gland is very large, and of a stony hardness. It never can suppurate; it is even threatened with a cancerous inflammation; it is indeed incapable of any other. The pain requires that something should be done, and our prognostics may be safely grounded on this unquestionable assumption, that such a tumour will not fail to

grow, and that, in one or two years, the deformity and bulk will of itself be a motive, while the suffocating condition of the patient will be an absolute reason for operating, however dangerous the operation may be rendered by such unwise delay. It is moreover to be observed, that this gland is the submaxillary gland, which has the facial artery niched in between its two lobes, not so inextricably, indeed, as the parotid is connected with the carotid artery, but in a degree to give trouble to the surgeon, and accompanied with a degree of danger, in the case of operation, which is well worth calculating.

“Thirdly, we are to regard the actual circumstances of every patient as a part of his case, and the danger to this lady, if remanded to her own country, so far distant and so difficult of access, is but too palpable. Should we speak to her the usual temporising language, and say, ‘It will perhaps get well; a slight course of mercury or cicuta may be useful, and time may do much; perhaps it may be well to wait;’ it may happen that the gland may become stationary in its growth. A mercurial course may be of use, but I fear that this is, in the truest sense, tampering with a tumour, and that time can do nothing but increase the danger.

“It seems to me but too possible that this lady, before she can take a second resolution and accomplish a second journey, will be suffocating and in immediate danger of death. Then we should not venture to do that operation which is now comparatively easy; for this gland being seated in the angle betwixt the trunk of the carotid artery and its first great branch, the maxillary or facial, will distend that angle, and both the trunk and its branch will be too closely united with the tumour to admit of operation, or will make the operation most dangerous and critical.

“Fourthly, though there is no imminent danger in the proposed operation, the circumstances are sufficiently forbidding to make it far from being a matter of choice. My assistant was unwilling that it should be performed without the advice of Dr. Munroe, and his assent seemed rather reluctant. The tumour is of a very considerable size; it is plainly the sub-

maxillary gland, as may be inferred from its shape, size, and peculiar hardness; not a lymphatic gland, for then, most likely, more than one would be enlarged. We must be resolved to deal with the artery in one of two ways: either to dissect it so from the tumour as to insulate the artery, and turn the tumour from under it; or, should this attempt threaten to embarrass our operation, to cut it across where it lies over the middle of the tumour, tying before dividing it, lest it should shrink back towards its trunk. No one circumstance is so favourable to the operation as that extreme hardness of the tumour which makes the operation necessary, for that shows it to be circumscribed, and to be little connected by inflammation with the cellular substance.

“NOTES OF THE OPERATION.

“We had agreed either to dissect so as to lay the artery on one side while employed in extirpating the gland, or to tie and cut across, and so proceed with greater freedom in the more dangerous part of the dissection; but after the first incision, which I made according to the length of the jaw-bone, the incision being long and more free, the several parts appeared in so advantageous a state as to leave no doubt nor difficulty in the rest of our proceedings.

“The artery presented itself arching over the diseased gland, much elongated and serpentine, so that in place of embarrassing the operation with any needless delicacy, or endangering the shrinking up of such an artery towards its trunk, we passed two ligatures of single thread under it, cut betwixt the ligatures, and then proceeded more confidently in extirpating the gland. There we found no such adhesion of it to the trunk, or rather to the sheath of the carotid, as we had reason to apprehend. The tumour was of such a stony hardness, the cellular substance so loose, the arteries so disengaged from it, that without the help of the knife, with only the swallow-tailed end of its handle, which I used as a scalpel, I turned out the tumour in a few seconds, and the tumour carrying its cellular substance

along with it, the styloid muscles were left as clear, distinct and bare as after a neat dissection upon the dead subject."

"CASE II.*—A young woman of Berwick whose native peculiarity of accent had got a singular aggravation by such an uncouth obliquity and imperfect motion of the tongue, as conveyed the notion of her attempting to chew and turn each vocable with her tongue before she proceeded to swallow it, in place of uttering it.

"This was produced by a tumour of very great size, and of an appearance so peculiar as plainly to denote its character. It consisted in a vast collection of matter in the sublingual gland, and as that gland is covered by the whole thickness of the tongue within, and by the mylo-hyoidœi muscles without, and bounded by the line of the jaw-bone, it had the following singularities of character. It could not be distinguished as a tumour, but had rather the appearance of a general swelling of the lower part of the face, jaw, and neck, such as often accompanies severe toothache or mumps. Upon laying the hand upon the outside of the neck, below the lower jaw-bone, the whole hand was filled with a swelling, apparently solid, but so little convex or circumscribed as to resemble in no degree the tumour of any particular gland, and yet so limited and so firm as not at all to resemble the general tumefaction proceeding from toothache. Upon introducing the finger into the mouth, you found the tongue raised, turned edge uppermost, and pressed entirely towards the left side of the mouth, the external tumour being upon the right side. Upon pressing the fingers very firmly down by the side of the tongue, and reaching from without, you could sensibly perceive not so properly a fluctuation as an elasticity, which implied the presence of a fluid; the tumour seemed elastic like a foot-ball, but with a degree of tension which made it seem almost solid. It was by comparing a variety of circumstances, especially the original place and slow growth of the tumour, that I confidently referred it to the sublingual gland. In this I had the advantage of the surgeon under whose particular care she was, but I did him the justice to send

* Principles of Surgery, by John Bell, edited by Charles Bell.

her back to him, again and again, expressing my opinion and my wish at the same time, that he should do whatever he might suppose right. By good fortune, she called upon me the day she was to return home, nothing being as yet done to the tumour, but supplied with abundance of blisters and plasters to apply at a fit opportunity to her throat. I felt now that professional ceremonies should give way to essential charities. I placed her in a chair, and almost without her consciousness, at least before she was aware, I struck a fine bleeding-lancet deep into the tumour by the side of the frænum of the tongue, when, from the firm compression of the surrounding parts, the matter, though too gross to pass freely through such an opening, was spewed out from the orifice, in a manner expressly resembling that in which yellow paint is squeezed out from the bladder upon a painter's pallet. It was of a deep saffron-colour, thicker than mustard, mixed like gruel with seed-like particles, and exceedingly fetid. I knew that the tumour was not emptied, though the outward swelling was almost gone, but I also knew that though I should not enlarge the opening, the second secretion from the surface of the sac, which is in all cases thin, would dilute and wash out whatever viscid matter remained; and when she saw how suddenly my prognostic was fulfilled, she expressed a perfect confidence in whatever I predicted, and a perfect willingness to submit cheerfully to whatever I proposed to do. Next day I introduced the point of a probe-pointed bistoury into the orifice made by the lancet, and knowing that the lingual artery lies on a lower level, embedded among the muscles, and running along the lower surface of the tumour, while I had over the point and blade of my bistoury nothing but the inside membrane of the mouth, much thickened, I run it fearlessly and at one stroke, as the less painful way, along the whole length of the tumour, when the thickest of the yellow mucus flowed freely or was raked out with the points of the fingers and the handle of the bistoury; and the tongue descended now to its natural level, was in a capacity once more of delivering the peculiar dialect of her native city in all its purity.

"So tense and apparently solid was this tumour, in consequence of the compression by so many surrounding muscles, that her surgeon mistook it for a solid and strumous swelling. I reckoned that in this, as in all cases of sacculated tumour, the second secretion, which was thinner, would wash out the thicker mucus, and I was not deceived; but she left me too early for me to witness the obliteration of the sac.

"I find it, in all such cases, a matter of some importance, especially in a girl, to anticipate the outward suppuration of any sacculated tumour, by puncturing it, though to a great depth within the mouth and under the tongue, and equally necessary to be at pains in preserving the opening and obliterating the sac; a slight misconduct in this respect occasions much distress to the patient, and much superfluous labour to the surgeon. Among the examples of this which I have had occasion to remark, the following is the most instructive.

"CASE III.—The case of Peggy Hall represents a tumour, which in all its stages, and for a course of three years, was ill understood and worse treated. She was a stout and lusty girl, about twenty-two years of age. The tumour occupied all the left side of the neck, from the lobe of the ear and angle of the jaw, quite to the sternum, displacing the mastoid muscle. This, like the tumour of Jenny Brown, arose from that slight inflammation which follows the extraction of a tooth. More than two years ago, after being distracted with toothache, she had two carious teeth pulled from the lower jaw, and she distinctly remembers that two days after the extraction of the sound tooth she was sensible, upon undoing the flannels in which her swollen and inflamed face had been for some time wrapped up, that there was a little lump about the size of a small plum. It lay under the angle of the jaw, and had never ceased to grow, and has now, without the slightest pain or change of colour, attained the present size. In the month of April, 1799, she was directed to apply some kind of plaster. In May, Dr. Monroe advised her to have it opened. In a few weeks after, this was attempted by the surgeon of the village in which she lived, who made a large incision, but being soon

alarmed, he laid aside the knife and lancet, and prosecuted his work rather by boring than by cutting. He tried, with probes and directors, to make good his way into the sac, but having pushed them very deep, and toiled half an hour in vain, abandoned his purpose.

“The tumour was distinctly a great sac of fluid secretion. There was nothing doubtful in the case. The sac lies under the platysma myoides, and under and before the mastoid muscle. The belly of the mastoid being raised upon the bag or tumour, feels soft and flaccid, and might have seemed to an unskilful surgeon to form a part of the tumour. By making his incisions over the belly of the muscle, he could not penetrate to the sac otherwise than through the body of the mastoid muscle. Having cut to a considerable depth among solid and quivering flesh, he became alarmed. Willing still to penetrate farther, and yet without danger, he bored with his finger, cut a little obliquely with his knife, and bored a little more with his director, till, having buried it apparently in the tumour, to the depth of three or four inches, he believed, and to the ignorant relatives and patient seemed to prove, that there was no fluid in the tumour, while there was nothing singular in all this but his own awkwardness. He had penetrated entirely under the belly of the mastoid muscle, pushing his probes obliquely between it and the sac. To avoid the great vessels of the neck, he wrought obliquely backwards, and by cutting obliquely backwards, he made good his way under the belly of the mastoid muscle.

“The young woman endured the disappointment, and suffered the tumour still to extend, not without great inconvenience and deformity, for seven or eight months; the operation being then performed more correctly and confidently, every circumstance tended to confirm the notions I had formed of this awkward proceeding. The surgeon who now operated was timid and careless in conducting the cure.

“The incision through the skin only was freely made. The incisions through the platysma myoides were made timidly, the flesh of its fibres retracting and quivering as they were cut.

The sac then burst from betwixt the divided fibres of the muscle, white and transparent. Upon this being divided, several pounds of thin serous fluid gushed out. Then the long iron probe was passed across the cavity of the tumour, and its point cut upon at the anterior edge of the mastoid muscle; in short, near the place of the former incisions; whereas, to lie across the tumour, the point should have been cut out behind the belly of the mastoid, and then the seton or cord would have more effectually inflamed the sac and obliterated the cavity.

"But this girl was doomed still to suffer from timid practice. The seton, ill introduced at first, was worse managed. In whatever way introduced, it should have been made to obliterate the sac. The sac was permitted to remain always half full; its walls were never brought together so as to favour their adhesion; the cord was even withdrawn and the orifice permitted to heal; the fluid again collected to the amount of two pounds; it was again evacuated by freeing the old opening, slitting up a part of the muscular sac with a probe bistoury, and obliterating it (a purpose which was very slowly accomplished), by strong injections of port wine and stimulating medicines.

"The case of this girl, which was protracted by unskilful treatment to six months, should have been accomplished in three weeks, and while the sac was pouring out matter from its thickened walls, and hardening into a solid tumour under the jaw, the girl was in danger of having established an incurable and growing disease; for a tumour so situated, and proceeding from such a cause, could never, by the most dexterous operator, have been dissected away from the neck and jaws."

I have felt no hesitation in quoting at length the preceding narratives of cases, and the excellent remarks attending them. Facts like these impress the mind of the reader much more forcibly and permanently than dogmas. In the instances above cited, we see what serious consequences to the glands of the mouth may be occasioned by the operation, to which every man thinks himself competent—the extraction of a tooth; and we also see how very important it is to be able to detect the na-

ture of the disease in its earliest manifestation, and to apply the bold prompt remedy which only can prevent the threatened mischief.

Certainly, if the dentist, however careful, may be the unfortunate agent to produce such tumours, he ought at least to be prepared to do all that skill can do to remove them.

TUMOURS OF THE PAROTID GLAND.

The parotid is the greatest of the salivary glands, and furnishes the largest part of the saliva. It is situated in the irregular cavity bounded by the ramus of the lower jaw and the mastoid process of the temporal bone, penetrating as deeply back as the styloid process, and even dipping behind it. It extends from the zygoma to the angle of the jaw, and from the meatus externus and mastoid process to the masseter muscle. This gland is subject to ordinary inflammatory swelling from cold, and especially to a peculiar specific inflammation, called *cynanche parotidea*, or vulgarly, mumps.

The parotid is also sometimes the seat of carcinomatous disease, and may be affected by all the modes of disorganization which affect glandular structures.

The position of this gland, and its vascular and nervous connexions, render its extirpation one of the most difficult operations in surgery. Until recently, the complete extirpation was considered impracticable, and even now many doubt that it has ever been effected. Allen Burns, Boyer, Richerand, and other celebrated anatomists and surgeons, declared that the safe extirpation of the whole parotid was impossible; but there can be no reasonable ground for rejecting the testimony of the distinguished and honourable men who claim to have succeeded in the operation.

The credit of having first demonstrated the practicability of this operation by actually performing it, seems to be due to Prof. Samuel White, of Hudson, N. Y., who extirpated the entire gland, for a carcinomatous tumour, in the year 1808; though there is some reason to suppose that it had been per-

formed by some of the older surgeons. It certainly had been attempted.

Notwithstanding that the patient was examined by experienced surgeons, who satisfied themselves of the fact of the complete extirpation, the operation was not attempted in Europe until 1823. It has since been performed repeatedly on both sides of the Atlantic.

That excellent surgeon, the late Dr. George McClellan, of Philadelphia, performed the operation in 1826, when the possibility was yet denied by eminent authority, and ten times subsequently. In all these cases the entire gland was removed, and in all but one the patients recovered.

His son claims for him, with apparent justice "the credit of having done more than any other surgeon, by the numbers and success of his operations, to completely establish, as safe and feasible, the extirpation of the parotid gland."

As the result of the testimony now submitted to the profession, it is sufficiently determined :

1st. That the exsection of the parotid, though an exceedingly difficult, is, in the hands of a good anatomist and skilful surgeon, a feasible operation.

2d. That the carotid artery and its larger branches are necessarily implicated in the operation.

3d. That it is impossible to spare the facial nerve, and consequently paralysis is an inevitable result of the operation.*

I think it unnecessary to give any directions, gathered from the experience of the most successful operators, for the performance of so very delicate and dangerous an operation as the extirpation of the parotid. No sane man will attempt it unless perfectly acquainted with the anatomy of the parts, and as familiar as reading can make him with the history of previous operations. To one thus prepared, there needs but the bold heart and expert hand to secure at least the utmost likelihood of success which the character of the operation will admit. There are no men whose habits of operating beget more facility

* Cooper's Surg. Dict., by Reese.

in manipulating, more nice manual dexterity, than dentists, and if they will acquire the necessary information, they may become the most expert of operators. The example of Dr. S. P. Hullihen, of Wheeling, is worthy the imitation of all who would be scientific dental surgeons.

SALIVARY FISTULA.

The duct of the parotid gland, called the duct of Steno, emerges at the upper extremity of the middle third of the anterior edge of the gland, and proceeds forward and inward, directly under the skin, and on the masseter muscle. It is distant from three to five lines from the lower edge of the zygoma. It passes on the anterior edge of the masseter muscle, penetrates between the fibres of the buccinator muscle, and opens in the lateral walls of the cavity of the mouth opposite the first posterior molar tooth of the upper jaw, according to Meckel, the second molar, according to Harris, and the second and third bicuspid, according to Cooper—the situation of the opening differing somewhat in different subjects.

This duct, being very superficially situated, is exposed to injury, and is often wounded by an incautious operator, or by a blow. Sometimes, also, the duct may be obstructed by the pressure of a tumour or by inflammation. In such cases the saliva will accumulate until it makes a passage through the cheek, and continuing to pass through the opening, will form a permanent opening, which is called *salivary fistula*.

The discharge of the saliva over the cheek is very annoying, and the artificial opening is a very serious deformity.

A variety of methods have been employed to cure salivary fistula. Monro inserted a seton from the external fistulous opening into the mouth, and kept it there until a new fistula, open both on the cheek and in the mouth, had been fully formed. He then destroyed the edges of the external opening with lunar caustic, and caused adhesion between the new surfaces produced by the sloughing of the superficial eschar. The saliva of course continued to flow through the fistulous channel into the mouth.

Dessault also employed a seton, but he introduced it through a canula, as follows : Inserting two fingers of his left hand into the patient's mouth, and placing them between the teeth and cheek opposite the fistula, he introduced a small hydrocele trocar in its canula, through the cheek, just before the opening of the posterior part of the duct, and in a direction inclined a little forward. An assistant now took hold of the canula, while Dessault withdrew the perforator, and passed a line of thread through the tube into the cavity of the mouth. The canula was then taken out, and a seton, which was then fastened to the end of the thread in the mouth, was drawn from within outwards, but not so far as to come between the edges of the external opening, where the thread alone lodged, and this was fastened with sticking-plaster to the outside of the cheek. The outer wound was dressed with lint and compresses. Dessault used to change the seton daily, introducing regularly rather a larger one, and always taking particular pains not to permit it to pass between the edges of the external opening.

The patient was enjoined to use the jaw as little as possible, and for some time confined to liquid food. In about six weeks he omitted the seton, leaving in the thread for a little while longer. This being taken away, he completed the cure by touching the little aperture remaining, with caustic. Beclard succeeded several times, by passing a leaden stilet from the inner surface of the cheek into the duct, at the point where it was obstructed. He then made a fresh incised wound of the external fistulous opening, and closed it with the twisted suture.

Mr. Samuel Cooper prefers the operation of Beclard, when possible, as causing a more speedy cure.

CHAPTER XXII.

TUMOURS REQUIRING AMPUTATION OF A PART OR THE WHOLE
OF THE UPPER JAW.

THE superior maxillary bone is frequently the seat of tumours, which, from their enlargement, interfere with the functions of speech, deglutition, and respiration, and often prove fatal.

Some of these tumours are of the malignant fungous variety. These, commonly, are seated in the antrum. The first indication of their presence is an aching of the face, which is usually attributed to toothache, but which continues and aggravates, notwithstanding all the efforts to alleviate it. The jaw rapidly swells, and the nostril of the affected side is soon obstructed to respiration, and discharges matter. The walls of the antrum are soft, and yield readily to pressure. The nostril is filled with a bleeding tumour. The disease rapidly progresses—finds its way into the throat, detaches and pushes forward the teeth, throws out an enormous fungus into the mouth or on the cheek, hectic and emaciation rapidly reduce the patient, and he soon succumbs to aggravated suffering.

With such a disease as this, we have no means of contending. An operation would be worse than useless. Fortunately its progress is rapid, and death speedily brings the ardently desired relief.

There is another form of tumour, which commences in the periosteum and bone, often from some accident, as a blow or fall. This tumour is of slow growth, and is solid and resisting. It is little sensitive, does not bleed, nor involve surrounding tissues except mechanically by its growth. In short, it is

a tumour of the *benign* kind, not connected with constitutional disease, and it may be removed with entire safety.

In proceeding to remove a tumour of this kind, involving the superior maxillary, the surgeon must have in view, 1st. To take away every portion of the disease; and 2dly. To cause as little deformity as possible. The tumour should be got out whole; any incision into it would probably induce an embarrassing hemorrhage.

The operation itself is by no means dangerous, as compared with other amputations, and it may be performed without much difficulty, by a dexterous and confident surgeon.

Mr. Liston's directions for performing the operation are as follows: "Having to work among bones, you must use a good, strong, and broad knife—one with which you can make free and proper incisions. To uncover a very large tumour, you may make one incision from the point of the cheek-bone to the corner of the mouth, carrying it outwards also in the direction of the zygoma: another from the angle of the eye to the middle of the upper lip. The mark of these incisions must always be more or less apparent. But if you have a tumour of moderate size to deal with, you should make one incision from the angle of the eye, down the side of the nose, bring it under the alæ, and cut away the alæ from the edge of the superior maxillary bone; then you bring the cut down well towards the columna nasi, push the knife through the lip, and cut right down the median line. A scar from that incision will scarcely be perceived if the parts are cleverly and carefully put together.

"You make another and much less extensive incision from the same point, in the course of the fibres of the orbicularis palpebrarum, out towards the zygoma, carrying the knife under the eye; you can then turn downwards and outwards a large flap, uncover the tumour, and get to the processes of the bones. These being divided, the tumour almost tumbles out.

"Before commencing your incision, or after you have turned the flap back, you may require to take out one tooth, and you remove the lateral incisor. You must be provided with strong edged cutting forceps for dividing the bones, and very strong

scissors for separating longitudinally the palatine arch. Before applying them, you cut a notch out of the alveolar process of the tooth removed, with the point of the cutting forceps. Very often you are compelled to take away the os mala, or perhaps you may saw it through. Supposing that you are going to take away the os mala by the forceps, you divide the zygomatic arch and also the junction of this bone with the frontal bone, at the transverse facial suture. You cut the nasal process of the maxillary bone; then putting one blade of the scissors into the nostril, and the other into the mouth, cut down and you have destroyed all the attachments of the tumour. You must next carefully detach the parts within the orbit, cutting the superior maxillary nerve far back; that must not be drawn out from its origin; then putting your finger on the tumour, you detach with your knife any remaining connexions, and out tumbles the mass. You will be astonished to find how little blood follows an operation of this kind; it can be done in a very few minutes. There is seldom any necessity for stopping the bleeding temporarily by pressure on the carotid; after you have turned the tumour out, perhaps you will not find a single vessel to tie, or only one. You take hold of that with the fingers, put on a ligature, and then lay the flap down. The tumours should come out quite entire, and after stopping any vessel that may bleed, you put a dossil of lint into the cavity, bring over the flap, and put the parts neatly together.

“You introduce some points of interrupted suture under the eye and by the side of the nose; you attach the alæ, and then put two points of twisted suture into the upper lip. In a short time the cavity fills up, and it is altogether an exceedingly satisfactory operation. I have extirpated the upper jaw to remove fibrous tumours, nine or ten times, without the loss of a single patient. It is an operation more successful than the amputation of the leg, or, at all events, of the thigh, and is attended with as little risk.”

AMPUTATION OF THE LOWER JAW.

The lower jaw is also sometimes the seat of tumours which

may, like those of the upper maxillary, require the use of the knife.

These tumours sometimes consist of a deposit of a glairy fluid between the plates of the bone, gradually distending it; sometimes they are malignant, at others they consist of cartilage and bone.

Portions of the lower jaw have very frequently been taken away, and sometimes with but little difficulty. It occasionally happens, however, that a very large portion, even the whole, requires to be removed.

In exsecting a portion of the lower jaw, it is very important to avoid unnecessary disfiguration, and our ingenious countryman, Dr. Rhea Barton, has made an excellent suggestion on this point.

It is to preserve a rim or margin of the bone, so as to preserve the outline of the face, and afford a base for the insertion of false gums or teeth. In all cases where the extent of the disease will permit, this should be done, as the rim of bone thus preserved will be of immense use to the patient.

The incision through the soft parts should be made beneath the base of the jaw, so as to hide the cicatrix as much as possible.

Prof. Mütter has succeeded in detaching a tumour with a portion of the jaw, without any external incision or deformity whatever. This tumour was seated upon the symphysis and two-thirds of the left ramus of the bone. The patient being seated, with her head supported by an assistant, the tumour was laid bare in its whole extent, by detaching the lip and integuments of the chin and cheek from the adjacent bones. *No external incision was made*, yet Dr. M. had no difficulty in turning the soft parts down under the bone, so as to leave its base perfectly visible. Next, partly with a saw and partly with a strong scalpel, he cut through the base of the tumour, leaving a small rim of the bone, composed of the rounded portion of the lower jaw. Two perpendicular cuts were then made (one on each side of the mass), with the cutting forceps—and the tumour, thus loosened, was readily re-

moved with a few strokes of the scalpel. As the hemorrhage was profuse, the actual cautery and pledgets of lint steeped in creasote were applied, and with entire success. The lip was then brought back to its original position, and cold water dressing applied to the face. A perfect cure, without the slightest deformity, was accomplished in two weeks.

To our countryman, Dr. Mott, is due the honour of having first attempted, and executed successfully, the amputation of the lower jaw at the articulation; after him, Mr. Cusack, of Dublin, performed it. According to a note by Dr. Reese, in Cooper's Surgical Dictionary, the operation had not been performed by any others up to 1842. Mr. Liston, in his lectures delivered in 1844, speaks rather sneeringly about the "fuss" made about extirpating the jaw, and gives the credit of the operation to Mr. Cusack, of Dublin. He then proceeds to describe it as though it had been an every-day operation with him. This conduct of Mr. Liston is remarkable enough, but it is more strange that his editor, Prof. Mütter, has not corrected the error, and done justice to Dr. Mott.

The operation is one of the utmost difficulty, and it is useless to give any directions for its performance. None but a surgeon of well-tryed skill would be justifiable in undertaking it, and such a one would pay but little attention to *directions*. These of Mr. Liston may be well enough, but we do not know that he ever performed the operation on a living body.

Dr. S. P. Hullihen, a practising surgeon dentist, of Wheeling, and one of the best surgical operators in this country, has performed an operation upon the jaw, which well deserves to be recorded here. As Dr. Harris justly remarks, "the ingenuity, skill, and boldness displayed in the conception and performance of this complicated operation, place Dr. Hullihen at once among the ablest surgeons of the day." It is the more worthy of notice here, as having been performed by a dentist, who thus furnishes a model of what we would have a dentist to be—not a mere mechanic, employed to repair the teeth, or, if necessary, extract them—but an accomplished physician and surgeon, who, while devoting his attention particularly to the

teeth, is prepared to undertake the treatment of the adjacent parts, however formidable and complicated their diseases may be.

“Miss Mary S——, aged 20, daughter of the Hon. William S——, of Ohio, came to Wheeling, in the spring of 1848, to obtain relief from the effects of a very severe burn, which she had received fifteen years before. The burn was principally confined to the neck and lower part of the face, and its cicatrix produced a deformity of the most dreadful character. Her head was drawn downward and forwards, the chin was confined within an inch of the sternum, the under lip was so pulled down that the mucous membrane of the left side came far below the chin, the under jaw was bowed slightly downward, and elongated, particularly its upper portion, which made it project about one inch and three-eighths beyond the upper jaw. In front there was scarcely any appearance of either chin or neck. She was unable to turn her head to either side, the cheeks and upper lip were dragged considerably downward; she could not close her eyelids; she could not close her jaws but for an instant, and then only by bowing her head forward. She could not retain her saliva for a single instant; and, as might be expected, her articulation was very indistinct.

“She had been taken to the city of New York some years before, for the purpose of being relieved from this deformity, and was placed under the care of two of the most distinguished surgeons in that city, who performed an operation by dissecting up the cicatrix on the neck, then raising the head and sliding up the cicatrix from its original position, leaving a raw surface below to heal up by granulation. I need scarcely add that the operation was entirely unsuccessful.

“After a careful observation of the case, it became evident that such a complicated deformity could be best remedied by performing three separate operations: one upon the jaw, another upon the neck, and a third upon the under lip.

“To remove the projection of the under jaw, seemed to require the first attention. Unless that could be done the other operations, however successful, would add but little, if any, to

the personal appearance of the patient. This lengthening of the jaw had taken place entirely between the cuspidatus and first bicuspid tooth of the right side, and between the first and second bicuspids of the left. By the elongation, the teeth just described were separated on both sides about three-fourths of an inch.

“To saw out the upper edge of these elongated portions of the jaw, and then to divide that part of the jaw in front of the spaces thus made, by sawing it through in a horizontal manner, so as to permit the upper and detached portion to be set back in its original position—appeared to be the only possible way of remedying the deformity. This plan I therefore adopted, and performed the operation on the 12th day of June, in the manner now to be described.

“The operation was commenced by sawing out, in a V shape, the elongated portions, together with the first bicuspid on the left side, each section extending about three-fourths of the way through the jaw. I then introduced a bistoury at the lower point of the space from which the section was removed on the right side, and pushed it through the soft parts close to and in front of the jaw, until it came out at the lower point of the space on the left side. The bistoury was then withdrawn, and a slender saw introduced in the same place, and the upper three-fourths of the jaw, containing the six front teeth, was sawed off on a horizontal line ending at the bottom of the spaces before named, the detached portion being still connected, on the outer and inner sides, to the jaw below, by the soft parts.

“After having with the bone nippers removed from the detached portion the corners which were created by the horizontal and perpendicular cuts of the saw, it was set back, so that the edges from which the V-shaped sections were removed came together.

“Thus it will be perceived that this portion of jaw and teeth, which before projected and inclined outward, now stood back and inclined inward, and in its proper and original place.

“In this position the jaw was secured, by passing ligatures

around the cuspidati in the detached portion and the now adjoining bicuspidis in the sound portion, then taking an impression of the jaw in very soft wax, a cast was procured, and a silver plate struck up and fitted over the teeth and gum, in such a manner as to maintain the parts in that same relation, beyond the possibility of movement.

“The patient declared that the operation gave her little or no pain. There was a little swelling about the chin during the first three days after the operation, but not the slightest uneasiness. In this way the case progressed; the gum healed in a few days, the jaw united strongly and in the time bones usually unite, and the wearing of the plate was discontinued within six weeks after the operation was performed.

“The deformity of the jaw being now removed, the next thing to be done was to relieve the confined condition of the head, and the distortion of the face and neck resulting therefrom. This I determined to accomplish, if possible, after the manner of Prof. Mütter in similar cases, and I accordingly performed the operation on the 31st day of July, assisted by Dr. Wissell.

“I began by dividing the skin immediately in front of the neck, about half an inch above the sternum, and then carried the incision back about three inches on each side. I then commenced a careful division of the strictures, which were so thickened in front as to extend to the trachea, and on the sides as not only to involve the platysma myoides, but a portion of the sterno-cleido-mastoid muscle also. After dividing everything that interfered with the raising of the head and the closing of the mouth, as far as the incision was now made, it became evident that to give free motion to the head, the incision on the neck must be extended back through the remaining cicatrix, which was at least two inches wide on one side, and about an inch and a half on the other.

“This was accordingly done, the whole presenting a wound upwards of nine inches in length and nearly five in width. A thin piece of leather was now cut in shape of the wound, but somewhat larger, and placing it upon the shoulder and arm,

immediately over the deltoid muscle, a flap nearly ten inches in length and five in breadth, having an attachment or neck two inches wide, was marked out, and then dissected up as thick as the parts below would permit. This flap was now brought around and secured in the wound on the neck by the twisted suture, the sutures being placed about an inch and a half apart. Between each of these sutures, one, two, and sometimes three small stitches were inserted, depending entirely upon the number necessary to bring the edges neatly together. These stitches were of fine thread, had a very superficial hold, produced little or no irritation, and served to keep the parts in better apposition than any other means I could have devised. The wound of the shoulder was next drawn together about one-half of its entire extent; the remainder was covered with lint. One long, narrow strip of adhesive plaster applied around the neck to support the flap, and over this a cravat tied in the usual way, constituted all the dressing deemed advisable at this time.

“The patient bore this tedious and very painful operation with great fortitude, and uttered scarcely a murmur. She was somewhat exhausted, but not from the loss of blood. There was no vessel divided of sufficient importance to require a ligature.

“Aug. 1. During the fore part of last night, the patient was somewhat distressed, was very unmanageable, would talk incessantly, and occasionally sat up in bed. An anodyne was administered at 12 o'clock, after which she rested much better and slept some. Complains of sickness of the stomach this morning; has vomited three or four times; flap very pale; pulse rather weak. Directed to refrain from all kinds of drinks.

“2d. Complains only of pain in the shoulder; was much distressed the latter part of last night, on account of a retention of urine. The catheter was employed, and about three pints of urine drawn off, after which she rested well. Pulse somewhat excited; flap better colour.

“3d. The patient rested well last night; the use of the

catheter still necessary. All efforts to keep the patient from talking and moving unavailing; colour of the flap rather pale, save at the extreme point and about two inches along the lower edge, which is assuming rather a dark blue colour. Pulse about the same as yesterday; removed a pin from near the point of the flap, and enveloped the neck in cotton batting. Patient complains of hunger; chicken broth ordered.

"4th. Patient rested well; the use of the catheter yet necessary; complains of slight headache; the colour of the flap nearly natural, and even the point is assuming a healthy hue, and appears to be uniting; pulse almost natural.

"5th. Urinates without difficulty; bowels moved by injections; patient entirely free from pain; pulse natural.

"6th. Dressing removed; the flap is uniting by the first intention along both sides, throughout its entire extent; the greater part of the pins and stitches removed.

"7th. The remainder of the pins and stitches removed; patient perfectly comfortable and cheerful.

"10th. Sat up all day by the window.

"16th. Walked out to take an airing.

"During the whole progress of the cure, there was not the slightest swelling or undue inflammation in the flap or about the neck. The patient was slightly hysterical for the first few days, but never complained of anything but pain in the shoulder, a slight headache of a few hours' duration, and the uneasiness occasioned by the retention of urine. The wound on the shoulder granulated rapidly and skinned over in about six weeks after the operation. It was curious to observe that upon touching the flap after it had healed in the neck, the patient would always refer the sensation to the shoulder or arm from which the flap was taken.

"The confinement of the head and the distortion of the face occasioned by the strictures being now removed, the next step was to relieve, as far as possible, the very great deformity of the under lip.

"The under lip, from being dragged down and greatly stretched by the former projection of the under jaw, was ren-

dered greatly too large, so that it pouted out an inch or more further than the upper lip. This, together with a turning out of the mucous membrane on the left side, which extended nearly down to the lower edge of the chin, making the lip too short on that side, was the nature of the deformity yet to be relieved.

“To remove this unseemly appearance of the lip, the inverted portion was cut out in a V shape, extending down to the flap in the neck, and sufficiently large to reduce the lip to its proper size. The edges were then brought together, and secured after the manner of a single hare-lip. The wound healed in the most beautiful manner, and the appearance of the lip was greatly improved; but there yet remained a deep depression or notch in the edge, sufficiently large to keep exposed the tops of two or three teeth, besides preventing the coming together of the lips on that side.

“I now determined to raise, if possible, this depressed portion of the lip, and for this purpose I passed a bistoury through the lip, about two lines from the free edge, first on one side of the depression, and then on the other, and then carried the incisions downward to meet at a point on the lower edge of the chin.

“The depressed portion of lip now lying between the two incisions was next dissected loose from the jaw, and then raised to a level with the remainder of the lip, and there retained by pins, after the manner of dressing a double hare-lip, the line of union forming a letter V.

“This operation was as successful as the others, and the original deformity being now removed, the young lady, though still bearing evidences of the burn, has the free use of her head, eyelids, jaws, and lips, and may mingle in society without particular note or remark.”

CHAPTER XXIII.

DISEASES OF THE ANTRUM OR MAXILLARY SINUS.

THE cavity which bears these names is liable to be the seat of a variety of diseases. For the most part these are simple, and not at all malignant in their character ; occasionally, however, tumours and ulcers of a carcinomatous kind fix their seat in this secluded cavity, where their presence is unobserved until their local devastations or constitutional impressions have reached a most serious extent.

The danger of diseases of the antrum, however, cannot be estimated entirely by their specific character. The geographical situation of the cavity gives greater importance to its diseases than essentially belongs to them. Many a benign tumour, originating here, has proved fatal by mere growth and bulk ; the danger having been masked by the concealed position and the little sensibility of the parts, until interference was useless.

Nothing can be more important, therefore, than early attention to any of the commonly obscure, symptoms which intimate the presence of diseased action of any kind in this pathologically important sinus. The dentist commonly has the first opportunity to observe these signs and detect their cause, and he should always be ready to perceive and interpret them.

The lining membrane of the antrum is liable to be affected by all the diseases common to the mucous tissues. It may be congested, inflamed, and ulcerated ; it may undergo alterations affecting its secretions ; it may be the seat of various tumours, or may be involved in such morbid formations commencing in

the bony structures or the thin fibrous tissue which attaches it to the bones.

In treating further of diseases of this cavity, I will ask the attention of the reader to, 1st. Dropsy or retention of mucus; 2d. Inflammation of the lining membrane; 3d. Suppuration; 4th. Caries, necrosis, and other morbid conditions of the bony walls; 5th. Polypi and other tumours; 6th. The presence of insects in the cavity.

DROPSY, OR RETENTION OF MUCUS.

The term dropsy is entirely misapplied to this affection, and should be discarded. The disease has no similarity to dropsical swellings: those are occasioned by effusion of water, while the affection we are considering is a distension of the antral cavity by retained mucus.

If from any cause the antral openings become closed, the secretion of the lining membrane, no longer finding exit by evaporation, must accumulate in the cavity of the sinus. Being retained, it will necessarily degenerate; being degenerated, it will irritate the membrane, and the membrane being irritated, will pour out more than its usual quantity of secretion. The quantity accumulated will at length completely fill the cavity, and when once the sinus is completely filled, every additional drop of fluid thrown into it will cause the whole mass to act with great power upon the walls which confine it. However thick the walls, and however strongly knit together, they cannot withstand the hydraulic pressure continually augmenting within them. They are gradually forced outwards, and a rounded solid tumour gives external evidence of the outward pressure of the contained fluid.

Until the pressure becomes sufficient to distend the bones, the patient does not complain of pain; but as the walls of the cavity gradually yield and press upon the soft parts, pain is felt, which becomes more and more severe as the tumour increases. The integuments covering the distended antrum become swollen and red. A smooth, hard tumour presents it-

self, either in the roof of the mouth, or under the orbit, or under the cheek, and unless the contained fluid be speedily evacuated, the contents of the antrum will force their way through the bones.

As the distension of the walls of the sinus indicates nothing more than the fact of its being filled with some distending body, it may often be difficult at first to decide whether the contents be mucus or some kind of solid growth. So long as the tumour presents a tolerably uniform hard surface, there can be no certainty of the nature of the distending cause; but the uniformity of the tumour, the sense of weight, the slight discomfort or pain attending it, and, finally, the discovery of fluctuation, will determine the diagnosis.

The indication, of course, is to make an artificial opening and permit the escape of the contained matter, and then to make such applications to the lining membrane of the antrum, as will restore the natural secretion of the part.

There is no difficulty in making the required opening. The antrum is accessible at many points, and might be perforated almost anywhere without danger. Yet it is a very important thing to choose that point where the wall is thinnest, and where the perforation may be made with least pain and least injury to the parts, and which affords the most facility for the escape of the matter, during such length of time as an artificial opening may be necessary.

Jourdain, a French surgeon, who wrote very ably upon diseases of the sinus, recommended to the Academy of Surgery in Paris, that a sound should be passed into the antrum, through the natural opening. He represented that the operation was feasible, and being so, was, for many reasons, preferable to any other. Upon experiment, however, this mode of procedure has been found very difficult of execution in all cases, and altogether impossible in many, and it is no longer attempted.

The fangs of the molar teeth sometimes penetrate the cavity of the antrum, and generally their extremities are separated from it by a very thin bony partition. The cavity of the an-

trum is depressed posteriorly, and the position of the molar teeth represents the most depending part of it. It is, therefore, most advisable to make the opening through the alveolus of one of these teeth. Should one have been previously extracted, we should make the opening through its vacant alveolus; should all these teeth be yet in the jaw, one must be extracted, and of course, we should sacrifice a carious, in preference to a sound tooth. Should all be sound, it would be best to extract the second molar. Sometimes it will be necessary to extract two teeth, in order to obtain sufficient room for such an opening as will be desirable.

Sometimes the extraction of the tooth will be followed at once by the discharge of the fluid; an opening having been made into the antrum by tearing away the fang. More generally, however, it will be necessary to puncture the floor of the cavity.

The instrument preferred by Dr. C. A. Harris, for whose opinion, in such matters, I have great respect, is a straight trocar. The point of this instrument having been passed into the alveolus, should be pressed against the bottom, in a direction towards the centre of the antrum. The intervening plate of bone may then be easily pierced by a few rotary movements of the trocar. Care must be taken so to moderate the pressure applied, that the instrument may not, upon the giving way of the floor, be suddenly pushed across the cavity and made to wound the opposite surface.

Upon the removal of the instrument, a gush of fluid will follow. Should the opening not be sufficiently large to permit of the free passage of the thick matter which may be contained in the cavity, it will be easy to enlarge it.

Some surgeons advise that a bougie should be kept in the opening, others prefer a canula of lead or silver. Richter observes, that if a canula be left in, it should be carefully stopped, lest particles of food and drink should find their way into the cavity. Deschamps and Harris advise that the canula be secured to the adjacent teeth, and left in the opening. If a

bougie be used, it should be removed two or three times a day, in order to permit the matter to escape.

If fistulas have previously been formed, they will generally close after the dependent opening has been made. Should they not heal readily, their closure may be facilitated by touching their callous edges with nitrate of silver.

Having removed the mechanical evil, by evacuating the accumulated fluids, we must accomplish a cure by such constitutional treatment as the case may require, and by suitable local applications to the lining membrane of the antrum.

At first, warm water may be injected, in order thoroughly to cleanse the surface of the membrane, and subsequently we may throw in astringent or mildly stimulating applications, such as port wine and water, solutions of sul. zinc, sul. cupri, or even of nit. argenti. As the secretions are fetid, a weak solution of chloride of lime, or chloride of soda, may be injected, two or three times a day. Should the gums be inflamed, leeches must be applied from time to time, until the inflammation be subdued.

As the morbid condition of the mucous lining of the cavity may result from the irritation of diseased teeth or fangs, all suspected irritants of this kind must be removed.

In Mott's edition of Velpeau, I find the following remark—"If, as happens frequently, the sinus is distended by any liquid, its anterior wall, swollen out in the form of a border under the cheek, is, in general, so soft that a bistoury or scalpel penetrates it without any difficulty. The operation is then extremely simple. Having freely incised the superior part of this border transversely between the cheek and malar bone, I excise its inferior portion with a second cut of the bistoury. The loss of substance thus made, remains fistulous, and prevents the sinus from filling up a second time. The three patients which I treated in this way were promptly cured."

Should the teeth have been long previously lost, and the alveolus obliterated, the operator must choose between dissecting off the gum and boring his way into the antrum at the point already indicated, or performing some one of the several other modes of operation which have been preferred. Lamorier

directs, in such cases, that we should penetrate into the maxillary sinus immediately below the zygomatic process, between the cheek bone and third molar tooth. This is the point which corresponds to the summit of the cavity, where the walls are thinnest. An assistant provided with a blunt hook draws the labial angle outwards and upwards. The operator incises the fibro-mucous membrane which covers the bone at the point designated, by means of a scalpel or good bistoury; then perforates the osseous wall with a solid pointed instrument, enlarges the opening as much as he judges necessary, and finishes by introducing into it a tent of lint.

Other surgeons prefer the method originally suggested by Molinetti, first to divide the cheek between the projection of the malar bone and the suborbital foramen, then to penetrate through this wound into the interior of the sinus.

In a patient who had no longer any molar teeth, the idea occurred to Gocch of perforating the antrum highmoranium on its nasal wall, and of inserting therein a leaden canula.

A buccal fistula of the maxillary sinus suggested to Ruffel to penetrate that cavity with a trocar, and to compel it to come out above the gum, in order thereby to establish a counter opening. A seton was then introduced and kept in this passage during the space of six weeks with such benefit that success crowned the enterprise of the surgeon.

Cullison recommended that if the fluctuation should become perceptible at the vault of the palate, the artificial opening should be established there. Basch and Henkel have succeeded by means of a seton introduced through a fistula in the floor of the orbit, and brought into the mouth through an opening in the alveoli. Bertrandi proceeded in the same manner, with the exception of not using the seton, in a patient who could not open his mouth, and who also had a fistula in the orbital wall of the sinus.

In the process of Weinhold, the surgeon first directs his instrument to the upper and outer part of the canine fossa, directs it obliquely downwards and outwards, carefully avoids the branches of the suborbital nerve, perforates the sinus, and then

leaves a roll of lint in the wound. If the sinus has no other issue, Weinhold recommends that we should perforate it through and through, either by pushing the first instrument through the palatine vault into the mouth, or by means of a curved needle above the alveoli, when we wish to place the counter opening external to the gum. An eye which both instruments have enables us at the same time to pass through the sinus the conducting thread of a *meche* of lint, destined to perform the duty of a seton, and which may be smeared with any proper ointment.*

The disease we are considering is not by any means serious, as it depends upon slight and generally temporary alterations in the antral membrane. Recovery, however, is slow, and we must not expect to accomplish a cure under a period of several weeks.

INFLAMMATION.

The lining membrane of the antrum may be inflamed, from a variety of causes. Severe blows upon the face, injuring, perhaps breaking, the external walls of the cavity; cold acting for a long time upon the face; the accumulation of mucus within the cavity, undergoing degeneration, and becoming irritating to the surface upon which it rests—all these may, occasionally, induce inflammation of the sinus. But, undoubtedly, the most common cause is found in the diseases of the teeth, gums, and dental periosteal, which are communicated to the lining of the antrum.

The chief symptom of inflammation of the sinus is a dull, continuous pain in the upper jaw, gradually becoming more severe, spreading to the border of the alveolus, and seeming to fix itself in the roots of the molar and canine teeth. It sometimes occupies the whole side of the face, extending to the orbit and frontal sinus. The inflammation may begin in the teeth, and gradually extend to the antrum, in which case the severer and more paroxysmal pain of toothache will accompany the duller, deeper, more continuous ache of the antrum.

* Mott's Velpeau's Surgery, vol. iii.

As the pain increases, fever is developed, which will be more or less considerable, according to the degree of the inflammation and the sensibility of the patient.

Inflammation of the sinus can hardly be confounded with engorgement. In the latter case there is swelling of the bones, and in the former there is pain from the commencement of the attack. In fact, it cannot be mistaken except for inflammatory odontalgia, affecting the roots of the molar teeth; and from this, if these teeth be decayed, it cannot always be distinguished.

In inflammation of the antrum, we must use leeches to the gums, and, unless there be some good reason for omitting it, general bleeding from the arm, saline cathartics, and, in short, the whole antiphlogistic means. Opium may be used freely to lull the pain, and warm applications, by vapour or poultices, may also be tried.

If, however, there be pain which seems to be similar to toothache, and if some of the teeth, especially the molars, be diseased, and especially if one or more of them have been in the habit of aching, no permanent cure can be expected without removing them.

For the most part, however, we ought not to attempt this operation while the inflammation is unsubdued, as the injury inflicted by the violence of extraction must increase the vascular excitement of the part, and aggravate the distress of the patient. When the inflammation has been subdued, and the morbid irritability of the parts has subsided, the mouth should be carefully examined, and all diseased teeth removed.

SUPPURATION.

The inflammation of the mucous membrane of the antrum generally terminates in resolution; sometimes, however, it ends in the formation of pus, or suppuration.

When such is unfortunately the case, the pain gradually becomes less intolerable, and finally ceases in a great degree. The fever subsides, the patient may feel some rigors, and instead of acute pain there is a throbbing sensation in the part. If the outlet of the sinus be open, pus will escape into

the nostril, and unless it finds a free vent, some pointing will, after a while, be perceived in the alveolar border, or a bony protrusion will be noticed upon the cheek.

Suppuration of the antrum may occur without preceding active inflammation. Some cachectic habits are exceedingly prone to a slow, feeble inflammation, which is not attended by acute symptoms, and is apt to end in the formation of ill-conditioned pus, and frequently in ulceration of mucous membranes. This kind of suppuration is not uncommon in the antrum, and the inflammation preceding it is not unfrequently unperceived until the greater mischief of suppuration or ulceration has been accomplished. Even after suppuration, the true nature of the evil may be unsuspected; the more so, that the preceding inflammation has been unperceived.

When there is dull, continuous pain along the border of the sinus, apparently not depending upon caries of the teeth, if there be swelling of the sinus, especially if the patient be of a strumous habit of body, we may suspect suppuration. Should pus escape into the nostril, of course the diagnosis will be complete.

If there are any carious teeth, they should be removed. They may be the cause of the pain; they may even be the cause of the suppuration. In any case, their presence is mischievous, and, moreover, we must have access to the cavity through the alveoli.

The treatment must be similar to that recommended for mucous accumulation. Should the disease be the consequence of general ill health or depraved constitution, the proper constitutional means must be employed. The mouth must be cleared of decaying teeth, and the patient must avoid exposure to cold.

CARIES, NECROSIS, AND OTHER MORBID CONDITIONS OF THE BONY WALLS.

Caries is an affection of the bone, somewhat analogous to ulceration of the soft parts. In this disease there is loss of substance, causing, for the most part, irregular perforation of the osseous structure, giving, in many instances, a honeycombed

or worm-eaten appearance; at other times the destruction may appear in a continuous superficial excavation. There is a discharge of a dark, fetid, sanious pus, and frequently a growth of fungous granulations shooting up from the excavations.

The bones, though hard and dense, are vital structures. They are supplied with blood-vessels and nerves, and cellular tissue. They are capable of growth and reproduction, of absorption, and separation of dead from the living parts, by a vital process. Of course they are subject to diseases—and to diseases only differing in appearance from those affecting softer structures, by the necessary modifications resulting from the peculiar density of the osseous structures.

Caries may occur in bones, from the same causes which induce ulceration in the soft parts. Anything which lessens the vitality of the parts, diminishes its nutrition, or causes excessive interstitial absorption, may cause caries.

External injuries may be the exciting cause, though far more commonly productive of *necrosis*. Long-continued inflammation or irritation of neighbouring parts; inflammation of the periosteum, and, above all, certain constitutional vitiations, are causes of caries.

Scrofulous persons, and those whose fluids are tainted with the syphilitic poison, are most apt to engender this and other diseases of the bones.

Generally, a fistulous ulcer, somewhere in the vicinity of the carious bone, will discharge the dark coloured, fetid, and often bloody pus which I have mentioned, and this will commonly be a sufficient evidence that caries lies beneath. M. Strack, however, is quoted by Jourdain, as having met with an ulcer in every way similar to those usually marking caries, which was, in reality, unconnected with any disease of the bone.

When the finger can be brought in contact with the bone, which, however, can rarely be the case, the roughened feeling of the surface will at once determine the diagnosis. When this kind of examination cannot be made, a silver probe may often be passed to the bottom of the fistula, and the rough, grated surface of the bone perceived. Very often, however, the canal

through which the pus escapes is too tortuous to permit of satisfactory exploration.

If caries be not checked, it will end in *necrosis*, or complete death of the diseased bone; caries, however, is not necessary to necrosis, for the latter may occur without being preceded by the former.

Necrosis may be caused by any means which destroys the nutrition of the bone or any part of it. These causes are sometimes external; more commonly, perhaps, they depend, at least for their predisposing cause, upon constitutional vitiations, or defects of nutrition consequent upon general pravity.

When the walls of the antrum or alveoli are carious or necrosed, the soft parts adjacent inflame, ulcerate, and discharge a fetid, sanious, or ichorous pus. Sometimes the gums lose their vitality, become gangrenous, and are slowly separated by sphacelation.

Dr. Harris observes, that it frequently happens, that while caries is preying upon the antrum, its walls become softened to such an extent that they may be bent. This alteration of the bone, as well as the caries and necrosis, he says, are, in almost every instance, preceded by some other affection of the antrum.

Caries and gangrene of the antrum are very distressing affections, as, even when there is vitality enough in the bone to check the caries or throw off the sequestrum, the process is very slow; the fetid discharge of pus and the extreme sensitiveness of the inflamed and fungous soft parts, produce great misery to the sufferer, and excite the lively sympathy of all who witness his distress. The severest operation, which promises relief, will commonly be endured with patience by the unhappy victim of so protracted and intolerable a disorder.

It is not always easy to detect the existence of caries in the antrum, as the symptoms manifested by the surrounding parts, or detected through them, are similar in different affections. Should sanious pus make its appearance, we may generally infer the existence of caries; but in a few instances, the pus has been of a normal character and appearance, and though the presence of the pus, in appearance such as commonly attends

caries, may satisfy us, that such a state of the bone exists, the absence of such pus is not equally satisfactory evidence that the bone is entire. The exfoliation of pieces of bone would of course dispel all doubts as to the nature of the disease.

By probing where there is an ulcer, or by making an artificial opening where none exists, we can gently introduce a blunt probe and explore the suspected bone.

When the alveolar border or floor of the antrum is the seat of the caries or necrosis, there is little difficulty in ascertaining the seat and nature of the disease.

The swollen and purplish appearance of the gums will attract attention to the alveolar border: and soon separating from the sockets, ulcerating and sloughing, they will lay bare the diseased bone, and expose the true character of the disease.

“When situated in the floor of the antrum, the rough denuded bone may be easily felt with a probe or stilet, introduced through the fistula in the gums or alveolus of a tooth from which the matter is discharged.”—(Harris.)

Whatever may be the remote causes of caries and necrosis of the antral bones, the immediate cause is defective nutrition, resulting from disease or destruction of the periosteum; and among the most common causes of periosteal disease, are the irritation produced by diseased teeth, and that caused by the action of fluid detained in the cavity.

The first step towards cure, must be to evacuate any mucus which may be distending the antral chamber, and to remove any diseased teeth which may be suspected of causing irritation.

The following case reported by Deschamps* will serve to show that I have not laid unnecessary stress upon the agency of diseased teeth, in the production of caries of the maxillary bones.

M. Martin the elder, who enjoyed at Lyons, a well-merited reputation, communicated to me the following case:

* *Traite des Maladies des fosses Nazaes et de leurs sinus.*

M. D. had a carious tooth in the upper jaw of the left side. A dentist having refused to extract it, a violent inflammation occurred in the alveolus, and subsequently was communicated to the maxillary sinus. The result was a deposit of matter in the cavity of the antrum, and consequently a necrosis of the greater part of its anterior and inferior wall.

When the patient called upon M. Martin, he was passing a bloody and very fetid matter through his left nostril. The posterior part of the alveolar border felt denuded, and was covered with fetid mucus. Externally a considerable tumour occupied all the left side of the face, from the orbit to the border of the lower jaw. The appearances fully satisfying Mr. Martin as to the nature of the affection, he decided to attempt the extraction of the pieces of necrosed bone, in order to open a way into the interior of the sinus, and explore the state of the lining membrane.

By the aid of the elevator, he detached a fragment about ten lines in length, which appeared to belong partly to the alveolar border, partly to the palatine and partly to the malar apophysis.

In the mean time, carrying his finger into the opening he had made, he perceived yet two or three rough points, which led him to believe that he had not yet got away all the fragments. He postponed further efforts to the next day. Then he took away another fragment, which appeared to belong to the anterior wall of the sinus, and which was larger than the piece previously removed. After this he could find no more asperities, and he assured the patient that the operation, so far as the extraction of bone was concerned, was completed. No fungus could be perceived, and after the first day, the discharge of pus through the nostrils and mouth had nearly ceased.

In less than five days, the tumour of the cheek had subsided: the patient suffered no pain, and his breath ceased to be fetid. The only remaining inconvenience was an imperfection of speech, which resulted from the communication between the sinus and the mouth, and which would be remedied when the

opening of the alveolus should be closed either by the junction of the gums or reproduction of osseous matter.

Dr. Francis, of New York, describes a form of this disease which occurs in infants in hospitals, and under circumstances when the nutrition is impeded, as by scrofula, unwholesome air, insufficient aliment, &c. The disease frequently begins at the edge of the gums in contact with the incisor teeth. The soft parts become tumid, with hardness and pain. Sometimes the greater part of the side of the face assumes an erythematous aspect without any premonitory signs; and this is subsequently marked by spots of a dark purple or brown colour. Sometimes the part becomes speedily sphacelated, sloughing commences and emits fetid exhalations. The tongue is loaded with a foul sordes, and the breath becomes exceedingly offensive, when coma supervenes and death suddenly ensues. In other instances the teeth will become loose in the commencement of the disease, and not unfrequently drop out on the slightest exertion or motion of the jaw. The necrosis in some cases, will involve full one side of the jaw, and the ulceration extend equally over the soft parts and affect the *alæ nasi*, the nose itself and the cheek nearly to the orbit of the eye. Very soon the sphacelated flesh falls in, and the internal structure of the mouth will be exposed, while the lips will become tumid, painful and discoloured. These morbid changes, to a greater or less extent, are found to involve, very speedily, the teeth, alveoli, mucous surfaces, and cheeks. The disease is very dangerous, and often rapidly fatal.

In these cases, the disease is evidently the effect of constitutional causes, and no local treatment can arrest the devastation.

It was once fashionable for surgeons to make use of the most violent means for the cure of caries. The diseased bone was cut or burnt away, and the subjacent part carefully cauterized with a red-hot iron, in order to prevent the spread of the disorder. Such terrible means were rarely justifiable. When the disease is entirely local, and the constitution sound, all that the surgeon can do is to remove the cause of the caries, if yet existing; to lay bare the diseased part, in order to give

egress to the fluids, and admit the atmospheric air, which is a stimulant to the parts, or any other moderate stimulant which may seem likely to hurry the process by which the great surgeon, nature, is limiting and repairing the injury. The diseased parts should be cleansed with astringent and detergent washes; loose pieces of bone should be removed, and the patient rendered as comfortable as possible, and properly sustained by such nutriment as may be best adapted to his state of strength. Meddlesome surgery is bad.

When there is constitutional disorder, causing caries, or preventing the curative process, there will be no prospect of relief, unless the constitutional disease be removed. If the venereal poison has tainted the system, it must be counteracted by the specific means which so generally neutralize it. Should scrofula be the form of constitutional pravity, we must use, with far less hope, those general measures of regimen, diet, and medication, which promise most in such case.

When necrosis has taken place, the bone must be removed. By doing this, we do not interfere with, but assist nature, accomplishing at once, by mechanical means, what by the natural effort might not have been effected during weeks or months.

Should a very large opening be made in the floor of the antrum, it may not be closed by the unaided efforts of nature. In such case, it has been recommended to cauterize the interior circumference of the opening, in order to remove the edges, and induce greater activity in the parts. If the opening has been too great to permit of closure by the process of reproduction, we must make the best substitute we can for the lost parts, as it is imperatively necessary to close the cavity. "An obturator of gold should be accurately fitted to the parts, and secured by means of a broad clasp to a molar or bicuspid tooth; and if there be none suitable on the side of the mouth to which it is to be applied, the gold should be extended to one on the opposite side. If it be necessary to replace the teeth lost with artificial ones, these may be so mounted that the plate upon which they are set shall cover the opening into the maxillary

sinus, and thus obviate the necessity of any other obturator.”
—Harris.

SOFTENING OF THE BONY WALLS.

Mollities ossium, or softening and increased flexibility of the bones, is due to a diminution of the normal quantity of the phosphate of lime, upon which earthy ingredient the hardness of the bones depends. This may occur either from absorption of the earthy matter, or failure of the arteries to deposit it in sufficient quantity. It is a rare disease, but it sometimes occurs in the antrum. Unless accompanied by a similar condition in other osseous structures, it may be regarded as the consequence of some pressure from within the cavity, either by a tumour or contained fluid. So far as the softening itself is concerned, it cannot be considered a subject for medical or surgical treatment.

EXOSTOSIS.

This affection is a hypertrophy or morbid growth of the bone, in which the phosphate of lime is deposited in unusual quantity, and a hard tumour occasioned. It is not painful of itself, but by distension of the periosteum and superincumbent soft parts, it may gradually become a source of great distress. Generally, however, as the tumour augments slowly, the soft parts adjust themselves to the increased bulk of the bone, and the patient escapes serious suffering. Much, however, will depend upon the magnitude and position of the swelling, and upon the attendant condition of the periosteum. Should this be inflamed and sensitive, it may occasion acute pain.

I have already described this kind of morbid growth, in treating of tumours.

The bones of the face have very often been the seat of exostosis, and many formidable operations have been performed for the removal of such tumours. A number of such cases and operations have been described, both by the older and modern surgeons.*

* See Mott's Velpeau, vol. iii. p. 134.

These tumours sometimes attain to great size. M. Beaupreau presented to the French Academy, in the year 1767, an anatomical preparation, consisting of a tumour which occupied the whole right maxillary sinus, and several of the neighbouring bones. Its largest circumference is about twelve inches. The upper part of the maxillary bone projects on the side of the orbit, and straightens the cavity; the os unguis is included in the mass of the tumour, and is nearly effaced. The nasal bones of the left side are displaced, and the right nostril entirely closed up; and the exostosis projects so much on the left side as to be nearly under the malar bone. "Exteriorly," says Bordenave, "the tumour had a smooth and polished appearance, and its upper part was very hard. Interiorly, the substance of the bone was spongy, and not unlike pumice-stone."

Sir Astley Cooper describes a case of exostosis of each antrum, which pushed out both eyes, and eventually destroyed the patient by pressure upon the brain.

Jourdain notices an interesting case of this kind, reported by M. David, chief surgeon of the Hôtel-Dieu of Rouen, and adds the following, which came under his own observation :

Joseph Forcade, surgeon, had a son, who in early life gave promise of great vigour of mind and body. When six years old, he had the small-pox, which ran a most favourable course. When twelve years old, his father lanced a tumour at the inner canthus of the right eye, which suppurated for a long time after. Immediately after this, a prominence appeared about the middle of the nasal process of the right superior maxilla; and in spite of every application, steadily increased until it had attained considerable size. When the boy was fifteen, both maxillæ were equally enlarged; the bones of the nose seemed buried between the tumours, and its cartilages were so compressed as to impede breathing. The deformity was great, and at the age of twenty became, by the growth of the tumours, monstrous. The lower jaw became also exostosed, and acquired a very great size.

Though the deformity was shocking, it did not prevent the lad from travelling about and gratifying his naturally curious

disposition. He was clever, lively, fond of good living, and particularly of stimulating drinks. At the age of forty-four he was seized with a malignant fever—his first sickness since infancy—from which he was slowly recovering, when he was seized with pneumonia, of which he died.

“Upon post-mortem examination,” says Jourdan, “I could find on the face no trace of any muscles except those of mastication; but the skin seemed tightly drawn over the periosteum covering the numerous tumours. The head and face were everywhere exostosed, and as hard as marble. When the brain and soft parts were removed, the bones weighed in all more than eight pounds. The lower jaw alone weighed one pound, three ounces. The usual weight of the skull in an adult is one pound, nine ounces, showing an increased weight, in consequence of these exostoses, of six pounds, seven ounces. *The patient had never complained of pain, either in his head or face.*”

The symptoms of maxillary exostosis are very obscure. We have already seen that the disease may exist to an enormous extent without causing pain, the soft parts gradually thinning and distending before the pressure. When pain does exist, that symptom alone is not sufficient to convince us of the presence of exostosis. We have no certain sign but the peculiarly hard bony swelling.

When the disease is accompanied by periostitis, which it is particularly liable to be when occasioned by syphilitic constitutional vitiation, the pain may be sufficiently acute.

It is in cases such as these, that constitutional treatment has been found to arrest the deposition of bony matter, and the remedies most successfully used have been precisely such as are most efficient in constitutional lues. When no such taint exists, little can be done except to remove the tumour before its extent renders an operation difficult or impracticable. In many instances this has resulted in permanent relief.

FISTULA OF THE SUPERIOR MAXILLARY BONE.

Bones seem, notwithstanding their density, to be capable of inflammation, and even of abscess. I have already mentioned

caries as a kind of osteose ulceration, and there are many cases on record which seem to show that pus may be formed within a bone, distend its layers, and ultimately perforate its structures and evacuate itself through a fistulous opening. Probably in such cases, the suppuration is in the cellular tissue of the organ, rather than in the proper osseous tissues.

Jourdain records ten cases of this character, of which I have selected the following :

CASE I.—A lady suffered with inflammation of the root of an upper first bicuspid, on the right side, followed by alveolar abscess. After the inflammation had subsided, the tooth was removed ; but a fistulous opening still remained, emitting an ichorous discharge. After three months endurance of this, the patient took advice, had the fistula cut out and dressed with balsam. It healed, and for five months seemed perfectly cured. But the bone again swelled on the site of the old disease, and now extended as far as the second molar, was very hard, and was attended with deep-seated pains: the gums were inflamed and the tumour increased daily.

Consultation was held, and opinions differed. Some thought it exostosis, others that the sinus was involved. The late M. Morand called me (Jourdain) into the case, and we concluded, upon careful examination, that by piercing a swollen spot in the gum just above the old fistula, we should come upon an opening into the interior of the bone. The introduction of an instrument to the depth of a line and a half caused a free discharge of sanguineo-purulent matter, and the probe passed very freely into the cavity in the bone, the walls of which, above and below, seemed very firm. The socket of the extracted tooth had completely healed up.

M. Morand was in favour of an incision through the bone for the purpose of excising the distended portion, but with that unprejudiced liberality which always marks the man of true wisdom, he yielded to my arguments in favour of the cavity. I introduced the hot iron into the fistulous opening three times in eight days, following it up with suitable injections, which frequently brought away small fragments of bone from the inte-

rior of the cavity. The alveolus was soon reduced to its natural size, and in forty-three days the patient was perfectly cured.

CASE II.—Madame Massonet was referred to me by M. Moreau, of the Hôtel Dieu, for a fistula above and between the first and second superior incisors. At the posterior part of the palatine arch there was a considerable tumour, without pain, softening, or change of colour. From the summit of this tumour along the inner side of the alveolar ridge was a prominent line which seemed to mark the course of a fistulous canal from the external orifice to the tumour behind.

No further cause could be assigned than the fact that some years previously, the patient had received a severe fall, from which time the second molar became painful and gradually loosened. I removed this tooth, but without any benefit to the tumour. The other teeth were sound. Injections and other means had been tried at the time of the appearance of the external fistula, but unsuccessfully. I regarded this case as one of true abscess of the bone. I ventured, M. Morand approving, to enlarge the external opening and make an incision through the entire palatine tumour, which discharged only blood. Suitable injections and gargles were used, but to no purpose. I then decided to lay open with a knife the whole course of the supposed canal above mentioned, and touch it with mercurial water. On the third day, exfoliation of the parts thus touched exposed this canal. The subsequent treatment was very simple. The fistula was readily closed; and in six weeks the patient was sent home, perfectly restored.

CASE III.—Madam Boillard had a fistula on the anterior surface of the superior maxillary bone, the result of an alveolar abscess of one of the incisors. Those teeth were so much worn away as scarcely to project above the gum, but were not at all carious. An operator, who was consulted, extracted the second right incisor, which was immediately under the site of the abscess, and subsequently the first incisor of the same side, but without benefit. He then gave up the case, and the lady consulted me.

I discovered by the introduction of the sound that the fistu-

lous canal extended from the right second incisor in a tortuous direction, to the left canine, and as the two incisors on this side were very loose, I extracted them and found their sockets much softened. By destroying this softened bone, I established a free and direct communication for the escape of the purulent secretion of the fistulous canal. By medicated pledgets of lint, I healed the parts. There was some exfoliation of the alveolar substance, and a cure speedily resulted.

We see from this case, that caries is not the only cause of this disease. Irritation and inflammation of the dental pulp may occasion suppuration within the tooth cavity, which finding no vent in the direction of the crown, must escape at the extremity of the root, and may cause abscess, infiltration of the alveolar structure, and other grave injuries. In such cases a canal might be drilled through the crown, thus giving a direct escape for the matter, but if the suppuration have already extended to the alveolar socket, the extraction of the tooth is most advisable. (*Extraction is always most advisable.*)

CASE IV.—M. Petit sent to me a boy, who for a year past had been troubled with a fistula just above the left nostril. It had come without any previous dental inflammation or toothache, and had, therefore, been supposed by those who saw the case before me, to be consequent upon caries of the alveolus. A long and painful treatment, based upon this diagnosis, served only to increase the ulcer. With my probe I could touch the root of the second incisor, which, however, had never given any pain or uneasiness. On pressing my probe up with some force, I gave vent to a considerable discharge of pus, yet there was no tumefaction of the gum or loosening of the tooth. With some difficulty I prevailed upon the patient to allow the extraction of the tooth. This done, the pretended cancer healed in eight days.

In this case there was evidently inflammation of the alveolar or exo-dental periosteum.

CASE V.—A person came to Paris for the relief of an affection which resulted from alveolar abscess over the fangs of a decayed first molar of the right side. After the first attack,

although the abscess discharged itself freely, a sensation remained in the cheek, as though there was a small stone there. The second attack, though attended by a free escape of pus, left the cheek hard and swollen, and the eyelid much distended, with a peculiar clammy feeling in the region of the zygomatic and malar bones.. I first saw the disease at this stage.

On examining the mouth, I found a fistula between the gum and cheek, which penetrated the latter in a tortuous direction, and discharged an ichorous fluid. I removed the fangs of the first molar, but only blood followed the extraction.

On the fourth day, fluctuation was perceptible under the eye-lid, and on the sixth day, I made an incision there in the direction of the fibres of the orbicularis muscle. As the swelling subsided, I used a compress bandage, taking care to keep open the incision till all deep-seated suppuration had ceased. The subsequent cure was attended with no difficulty.

The student will find a number of other cases reported by Jourdain, whose book on the diseases and surgical operations of the mouth is a treasury of information upon these subjects. Though an old work, it is little known to the profession in this country, as it was not translated until the present year. An excellent translation, enriched with a number of very just observations, has recently been published by Messrs. Lindsay & Blakiston of Philadelphia. This translation is the work of a graduate of the Baltimore College of Dental Surgery; a young gentleman of much promise, whose extreme modesty has not permitted him to announce his name.* The work should be in the hands of every surgeon, and surgeon dentist in the land.

O Z E N A.†

This is a term applied to all those cases of fetid breath occasioned by inveterate ulcers of the primary air passages. These ulcers are sometimes seated in the antrum, sometimes in the nasal fossa, and are frequently connected with and owe their

* Dr. Philip Austen, now Professor in that Institution.

† Oζ», a stench.

fetor to caries of the bones. They are, therefore, more common in syphilitic and scrofulous subjects.

The breath of persons afflicted with ozaena is often so offensive as to render them almost intolerable to others, and the consciousness of the disgust which their presence occasions, is naturally a source of continual mortification and distress.

Where the ulcer can be perceived and reached, it should be touched with the nitrate of silver, and the application repeated until cure is effected. When no direct application can be made through the natural openings, as must be the case when the sore is seated in the antrum, an opening must be made as before directed, and a solution of nitrate of silver injected, if the caustic cannot be immediately applied to the part.

If the patient be tainted with syphilitic disease, no local remedy can be effectual. He must be placed at once under proper constitutional treatment, and this must be persevered in until the vice is eradicated. In case of scrofula, the same remark applies. Local remedies, however, are not by any means to be neglected. They may very much hasten the cure, and perhaps may render effectual constitutional means which otherwise may be impotent.

Every expedient should be tried before leaving the patient to suffer the distress and serious inconveniences attendant upon such a disgusting disease.

POLYPI AND OTHER TUMOURS.

Polypi are tumours of various consistencies and rapid growth, which appear in several cavities of the body which are lined by mucous membranes, but are most common in the nose, uterus, and maxillary sinus. They also occur, occasionally, in the rectum and vagina. They occur much more frequently in the nose than elsewhere, and next to the nose, in the uterus.

The tumour growing into all the irregular cavities of the nasal fossa, &c., has sometimes an irregular form, which from a fancied resemblance to the animal of the same name, has originated its designation.

Several varieties of polypoid tumours are described by wri-

ters. Mr. Pott thought one class of them always malignant, and another benign. The one like carcinoma being painful, causing constitutional irritation through morbid processes developed within itself, and tending to convert adjacent tissues into its own morbid structure, the other not painful, not causing any suffering, local or constitutional, except indirectly by producing pressure upon other parts or filling up cavities which are necessary to be kept open. In short, he considered that one class of polypi, the benign, are inconvenient or even fatal, merely by mechanical action; while the other, or malignant class, though equally troublesome by their pressure and obstruction which they cause, are per se pathologically dangerous to the health and life.

Deschamps describes four varieties, which he calls vascular fungus, mucous lymphatic, scirrhus, and sarcomatous.

Dr. Warren classifies polypi as membranous, fibrous, and vascular. The latter, he says, is rare. Jourdain recognised three kinds—one loose, pale, indolent, and benign, also called vesicular polypus; another, hard, unyielding, livid, and painful, marked with veins, and often hideous; and a third, fleshy, elongated, and easily stretched.

Samuel Cooper observes, "Some polypi are red, soft, and sensitive, but free from pain, and exactly like a piece of healthy flesh. When this kind of polypus is of a softer consistence, semi-transparent, and of a pale, yellowish colour, in consequence of being less vascular, it is called the gelatinous polypus, and usually arises from the mucous membrane of the side of the antrum, or the middle of the cavity of the nostril between the upper and lower turbinated bone. No doubt carcinomatous tumours in the antrum have occasionally been confounded with polypi, but there is no good reason for believing, as some have asserted, that true polypi never originate in that cavity. Many eminent surgeons have testified to having met with true antral polypi.

When a polypus of the benign kind occurs in the antrum, it may escape detection until it has completely filled the cavity

and begun to push its way into the nose and distend the walls of the sinus.

A tumour of the malignant kind might be suspected from the pain seated in it, and when enlarged sufficiently to press upon the bones, the twofold suffering produced by pressing and being pressed must cause greatly aggravated distress. The mechanical consequences of the continued pressure soon show themselves. The cheek swells, or rather is pushed out, the palate and alveolar ridge are depressed; the molar teeth are loosened, the gums become inflamed and spongy, the floor of the orbit is elevated; fistulous openings are often formed through which sanious pus percolates, or the matter finds its way through the opening into the nose, and at length the tumour, pushing through the floor of the antrum, appears in the mouth, or forcing its way through one or both of the distended nasal openings is seen in one or both of the nostrils.

Of course, the parts subjected to this pressure and disruption, become diseased, and inflammation, suppuration, ulceration, caries, and necrosis, may all be added to the list of secondary diseases incident to polypus. The causes of polypus are not satisfactorily ascertained. Probably they require some constitutional predisposition to render the parts where they appear capable of producing them, and when the susceptibility exists, any irritation may be the exciting cause of the morbid growth.

It is certain that diseased teeth and fangs must be regarded as the most common of the existing causes of polypus in the antrum.

The following cases from Jourdain are in point:

"In 1772, I had occasion to visit a shoemaker, living in the Faubourg St. Marcel, who had for some years had a kind of exostosis of the right superior maxillary. The tumour was as large as a medium sized apple, displaced the nose, deranged the palate, and threw the eye upward against the superciliary ridge, permitting the lids to open but slightly. The sinus had three fistulous openings: one below the malar process, a second near the bicuspid, and a third near the inner canthus of the

eye. In none was there any discoloration of the skin, and alternately, from the two first, there was discharged an acrid reddish humour. Most of the teeth of the affected side were lost; those which remained were sound, but much displaced by the tumour. The right nostril was obstructed by a polypus of a scirrhus hardness. In sounding the sinus through the fistulous openings, the instrument came in contact with fleshy masses in that cavity, some hard, some soft, giving out, when wounded, a bloody discharge, resembling wine lees. The nasal wall of the sinus was destroyed, but the maxillary bone was not softened.

“The disease seems to have had its origin in repeated attacks of alveolar abscess, the consequence of bad teeth, which usually terminated in fistula. Gradually the bone began to swell, and the nostril to become obstructed, till his appearance was much as I have described. Had I been suffered to operate, I would have removed all the teeth, good and bad, involved in the tumour, and then making a crucial incision through the cheek, would have exposed the bone, which, from its extreme thinness in this case, I might hope readily to remove. I would then have removed the exposed tumours from the antrum, by knife, cautery, or both combined, as occasion might suggest; looking carefully to the condition of the bone, and seeking, after the operation, to establish a healthy suppuration in the part.

CASE II.—*Polypus in the Right Sinus.*—In 1773, a lady, whose right cheek had been swollen and singularly hard for nearly two years, applied to me.

“The tumour was the result of successive inflammatory attacks of the first bicuspid and three molars of that side, only the fangs of which remained, and these were covered by a polypous tumour that had distended and softened the outer plate of the maxillary bone.

“I first made an incision down to the alveolar sockets, and after the arrest of the hemorrhage, removed the roots, twelve in number, each having at their extremity a morbid growth, showing that here was the chief cause of the disease. Their

removal caused considerable hemorrhage. I examined the wound on the next day, and found that the bulk of the tumour lay between the plate of the maxillary bone, diminishing upwards, and terminating at the orbit.

“Between the cheek and gums were two fistulous openings, which discharged a dark, fetid humour. The diseased state of the bones decided me to remove the tumour by two vertical incisions through them. This space permitted me to introduce my finger into the sinus. Its membrane was swollen, and there was yet a portion of the tumour attached to the orbital plate. This, from its propinquity to the eye, I feared to cauterize with the hot iron, and therefore used spirit of vitriol, with a small quantity of corrosive sublimate dissolved in it [nitrate of silver would be much better], being careful to employ dry dressings, that the escharotic might not, by spreading, cause injury to the surrounding parts.

“After eighteen days’ use of the same, a healthy appearance of the membrane was induced, suppuration established, and at the close of the fourth month, after some slight exfoliation of bone, the patient was restored.”

With regard to the treatment of antral polypi, it resolves itself simply into making an opening into the sinus, and removing the tumour.

Unfortunately, many of these morbid growths recur after removal, and grow with more rapidity than at first, and therefore it is necessary to destroy the mucous membrane upon which they are seated, so as perfectly to eradicate the disease. For this purpose, the old surgeons used the actual cautery freely. Probably the free application of lunar caustic would accomplish all that could be expected from the heated iron. It is often impossible to apply either so completely as to remove every particle of the diseased product; and if the tumour be a result of constitutional pravity, we, for the most part, gain little by the operation.

Dr. C. A. Harris thinks that in cases of malignant tumours seated in the antrum, the application of the *white hot iron* is indispensable to safety.

In remarking upon the bold practice of the French surgeons in the treatment of these affections, Mr. Thomas Bell commends their mode of procedure as worthy of praise and imitation, and expresses himself very severely against the timidity of English surgeons who have shrunk from the use of the actual cautery, and have left the patient to die with a lingering and painful disease, without any attempt at relief.

Certainly, as life is rendered intolerable, and death inevitable, by these tumours, we are justified in using any means which may promise relief. I have already (chap. xxii.), described a malignant fungous tumour which occasionally makes its appearance in the antrum. When the disease is of the malignant character, a cure cannot be expected.

The mode of amputating the superior maxillary, as described by Mr. Liston, has also been given in chap. xxii.

INSECTS IN THE CAVITY.

The human body has many parasites inhabiting its various tissues. More than a score of these have been described. Some infest the intestinal canal, others are found in the heart and large arteries; some dwell in the muscular, others in the cellular tissue; some prefer the liver, others the kidneys, and some the sinuses of the head.

The mode by which these creatures are produced, has long been a subject of curious inquiry, but it is not necessary for me to discuss the subject. It is enough to know that they exist within the body, and often prove troublesome inmates. That the larvæ of insects do find their way into the maxillary sinus, is proved by abundant evidence.

In the *Memoirs of the Academy of Surgery*, vol. v. p. 233, as quoted by Deschamps, it is recorded, that in the course of a disease of the maxillary sinus, there issued, from day to day, a considerable number of whitish worms, two or three lines long, some of which were living. The same author relates two instances in which long round worms were found in the maxillary sinus.

The most singular case of the kind is reported by Mr. Hey-

sham, a medical practitioner of Carlisle, and may be found in Cooper's Surgical Dictionary.

In this case, the patient was a strong woman of sixty, who was for many years subject to acute pain in the antrum, extending over one side of the head.

These pains never entirely ceased, but were more severe in winter than in summer, and were always subject to frequent periodical exacerbations.

The patient had tried anodynes without advantage, and had submitted to a mercurial course, by which her sufferings were aggravated. All her teeth on the affected side had been drawn. At length it was determined to open the antrum, though there was nothing to indicate abscess or any other disease in this cavity.

In four days no benefit had resulted from the operation. Bark injections and the elixir of aloes were thrown into the sinus. On the fifth day a dead insect was extracted by means of forceps. It was more than an inch long, and thicker than a common quill. The patient now experienced relief for several hours; but the pains afterwards returned with the former severity. Oil was then injected, and two other insects similar to the former were extracted. No others appeared, and the wound closed. She was much relieved for several months, when the pains returned worse than ever, and were particularly complained of in the frontal sinus.

We are not informed of further treatment.

Should worms be found in the cavity, they must be destroyed by the injection of oil, or other liquids likely to effect the purpose.

CHAPTER XXIV.

DISEASES OF THE PALATE.

THE palate is often incomplete through congenital defect. It is frequently the seat of disease, which destroys its soft parts, and even its bones.

As the palate forms the vault or roof of the mouth, separating it from the nasal cavities, and furnishing a most important part of the organ of voice and mastication, its diseases and deficiencies are of great consequence, exceedingly impairing the comfort and usefulness of the subject of them.

Congenital defects of the palate may differ very much in extent. Generally the deficiency is found along the median line, sometimes involving only the soft, sometimes also the bony structures. At times the fissure extends from the lips entirely along the median line of the roof of the mouth, presenting the appearance of the two lateral halves of the body not being united at this point.

Congenital defects, however, are not always so regular. Errors of formation may occasion an increase of the concavity of the arch, forcing the alveolar ridges too far apart, and producing deformity in the dental range. Sometimes, from an opposite condition of things, the alveolar borders may be brought more than usually close together. The teeth may be imperfectly developed, and their texture less dense than usual.

Mr. Stearns makes three classes of congenital fissure of the palate. The first class embraces all the cases in which the fissure extends through the velum, palate, and maxillary bones, to the alveolar border, and sometimes through the whole extent of the median symphysis. This is usually complicated with hare-lip.

In the second class, the bones of the palate are apparently entire, though the cavity of the arch may be somewhat greater than usual, and the fissure extend a short distance into their posterior margins. In this case, the lesion is almost wholly confined to the velum palati.

The third class embraces those cases in which the fissure is confined to the soft parts, extending, perhaps, only a short way up into the uvula. This form of fissure is, probably, less frequently met with than either of the preceding.*

When the palate is defective, the voice is impaired, and the impairment is in proportion to the extent of the lesion. Sometimes it is almost entirely destroyed by the inability of the patient to utter distinct sounds. Nothing can be more distressing than this calamitous injury to the organs of speech, which combines the distress arising from the consciousness of ludicrous appearance with the inconvenience of difficult and imperfect articulation.

Interference with the voice is not the only evil attending defects of the palate. Mastication and deglutition are also impeded. Food, notwithstanding the patient's careful or instinctive efforts, will find its way into the nose, causing great unpleasantness, and depriving the unfortunate subject of the deformity of much of the pleasure of eating, which, after all that has been said and written in its disparagement, is unquestionably the most universally prized of all sensual gratifications.

When the deficiency is congenital, the young infant finds difficulty in nursing, but generally, with that preservative instinct which is given to the little helpless creatures, in such perfection as to supply abundantly all lack of experience in such matters, the child generally contrives to manage its defective organs so well as to obviate much of the inconvenience naturally attending the deformity. Instead of taking the nipple between the upper surface of the tongue and superior gum, &c., the infant places the tongue on the nipple, and presses it against the lower gum, closing the palatine fissure with the tongue, as with an obturator.†

* Harris's Dictionary of Dental Science.

† Delabarre.

The mechanism of nursing is perfected as the child advances in life; dexterity of course increasing with the constant use of the parts, until such a proficiency is acquired that solids are masticated, and speech is as far as possible performed. The mechanism of mastication as performed in such cases is thus described by Delabarre. When the food is chewed, the aliment is conveyed between the tongue and movable floor, which serves for a point d'appui to it, and then it is brought back between the teeth. Thus it is that the complicated operation of mastication and deglutition is performed without the alimentary morsel getting into the nose, or if this does sometimes happen, it is the result of accident.

When perforations of the palatine arch occur in mature life through the agency of disease, the patient is in a much more unfortunate case than the subject of congenital deformity. The latter, gradually habituated to the performance of mastication and deglutition, with his imperfect organs, accomplishes these functions, if not well, yet with comparative comfort, while the former having been habituated to use the tongue differently, is not capable of adopting the mode of procedure applicable to his new condition, and consequently is continually passing his food and drink into the nose. If the teeth be not properly coapted, another source of difficulty and vexation is added, as the introduction of the food is thus rendered very troublesome.

If the velum and uvula be defective or wanting, deglutition is exceedingly difficult, as the alimentary matters, instead of passing comfortably along the pharynx, are, to a greater or less degree, forced into the posterior nares. This is the case whether the lesion be congenital or accidental. Sometimes deglutition can only be effected by throwing back the head as far as possible and casting the food into the pharynx.

The inconvenience of imperfect speech is as serious as that of incomplete or difficult mastication and deglutition.

Mr. Stearns says, that perforation or fissure of the palate may render the articulation of some of the letters impossible, and at the same time vitiate the character of all the others. The indistinctness of utterance is usually proportioned to the

extent of the lesion. Thus, when the fissure extends as far as the alveolar processes, the patient loses several of the letters, which another, with only a portion of the soft palate involved, is able to produce with considerable distinctness. In cases of fissure, particularly those of the more extensive kind, the movements of the tongue are comparatively limited, as the patient is instinctively aware that the very effort he should make in order to give letters their appropriate articulation, often serves to render the impediment more painful. So far, indeed, is this inactivity of the organs sometimes persisted in, that speech becomes little else than the emission of a succession of vowel sounds, which, in lieu of receiving proper consonant adjuncts, are only made intelligible by the accompanying inflection, key, gesticulation, and expression of countenance, all of which are, more or less, the vehicles of thought.* With the limited action of the tongue, nearly all the muscles concerned in the formation of articulate sounds, in a greater or less degree, participate, while the muscles about the nose, as the compressor nasi and depressor nasi are violently contracted, for the purpose of closing the nostrils and preventing the escape of the sound. This gives a particularly disagreeable aspect to the features.

The most common cause of lesions of the palate is syphilis. This terrible disorder, when once it becomes constitutional, produces a number of strange local affections, differing very much from one another, all of them distressing, and some of them dangerous, and not unfrequently fatal.

Beginning as a local affection, usually a primary sore, syphilis may gradually poison the whole circulating fluids, and cause defects of nutrition and alterations of tissue in various parts of the body.

The manner of effects produced by secondary syphilis, differs very much in different persons, as it is influenced by a variety of determining or modelling circumstances. Eruptions upon

* Observations on Congenital Fissure of the Palate, with some remarks on Articulation and Impediments of Speech, by Charles W. Stearns, Esq., Surgeon, London.

the surface, local inflammations, ulcers, augmentation and loss of parts, may all be occasioned by the penetrating and potent virus.

The soft parts about the throat are particularly apt to be the seat of constitutional syphilitic ulcers, and the bones of the palate are very frequently perforated or wasted by venereal caries.

It is very necessary, however, to be aware that palatine ulcerations, caries, and necrosis may occur from other than a venereal cause. It would be terrible indeed to add the cruel suspicion of such a malady to the sufferings of a patient whose disease, having no affinity to lues, should claim sympathy instead of begetting contempt and disgust. We must, therefore, be very careful to make no mistakes in matters of such delicacy. Moreover, the treatment of these affections must depend upon the accuracy of the diagnosis, and that which would be judicious in the case of syphilitic affection might be very improper under other circumstances.

When the true history of the case can be obtained, the facts will give much assistance in forming an opinion, but this can not always be procured; we are, therefore, often obliged to form our opinion from the appearances before us.

The only constitutional vice, other than the venereal, which may cause a similar palatine devastation, is scrofula, and when scrofula is the cause of the affection, the prevalent vice will display itself elsewhere, in derangements of the lymphatic system, and the other affections which usually attend upon this general pravity.

Syphilis is more rapid than scrofula; and the local affections produced by it are more painful. According to Mr. Hunter, venereal disease generally makes its appearance, in these parts, at once, in the form of an ulcer, without much previous tumefaction. He describes the ulcer as a fair loss of substance, part being dug out as it were from the body of the tonsil (if seated upon it). It has a determinate edge, and is commonly very foul, having a thick white matter, like a slough, adhering to it, and not admitting of being washed away. All authors, how-

ever, admit the extreme difficulty of distinguishing venereal affections in these parts, with absolute certainty, by merely local observation, and no appearance of sores about the palate warrant us in *declaring* the disease syphilitic, without corresponding symptoms justify the suspicion. While this is the case, however, any suspicious sore will authorize us to try such remedies as are known to be efficacious in syphilis, it being much more dangerous to neglect a syphilitic sore than temporarily to maltreat a scrofulous one. No purity on the part of a married female can always be satisfactory of her freedom from syphilitic taint, as, disgraceful as it is to human nature to make the confession, we are frequently compelled to recognise the ravages of the disease in these victims to the matrimonial tie, who are perfectly innocent of any impropriety. I need not say, that when the dentist discovers such a condition to exist, though humanity will demand that in some way or other the cure be provided, benevolence, no less imperious, requires, that the unfortunate subject of the odious inoculation shall be kept in blissful ignorance of the nature of the malady.

Of course, where venereal or scrofulous disease is at work upon the parts, proper constitutional remedies must precede all mere mechanical attempts to repair existing damage.

The devastation of the palatine tissues, soft or bony, may sometimes result from the local irritation produced by dead teeth, &c. This, of course, can only occur in those enfeebled constitutions in which nature is not able to resist even a trivial morbid impression, but seems barely capable of maintaining a nutrition equal to the ordinary wear and tear of tissues.

That such cases do occur, is stated by Jourdain, Harris, and many others.

Harris says,* “The local irritants occasioning the palatine diseases are dead and loose teeth, roots of teeth, salivary calculus, mechanical injuries, acrid humours, &c. The case of a lady of irreproachable character is related by Jourdain, in whom a scratch on the palate with a fish-bone, caused a tumour,

* Dictionary of Dental Science, art. Palate.

which suppurated and degenerated into an ulcer with hard elevated edges and a fungus in the middle." Dr. Cone mentions a similar case.

The following are reported by Jourdain :

CASE I.—“Mr. Noel had a tumour of the palate, which, on pressure, discharged pus through one fistulous opening, on the outer side of the right alveolus, between the canine and incisor, and another in the socket of the second molar, which had been removed some time since. The patient would not consent to proper measures in the first instance. The canine incisors and first molar became loose and were extracted; the alveolus around the site of the second molar sloughed away. The tumour still continued to enlarge, and some embarrassment was felt in the nostril: the patient then put himself under my care. The tumour, when lanced, discharged a very fetid pus, and I found, on introducing my probe, that a portion of the palate and maxillary bones were necrosed and almost completely detached. I removed them with ease: the one from the palate was the size of the nail of the index finger, that from the maxilla, larger. The removal of these sequestra, exposed the pituitary membrane of the floor of the nostril, as was proved by the sneezing excited by touching it on the lingual side. I dressed the wound for some days with dry lint, and then used gargles, &c. In twelve days the cicatrix was complete.

“I have treated many similar cases, arising from simple abscess, the sequel of dental disease. I have always, when the opening was of sufficient size, either awaited the natural separation of the sequestrum, or when assured that it was no longer adherent to the sound bone, gently withdrawn it. Simple causes may often be productive of extensive injury, as the following case will show :

CASE II.—“A bailiff, named Broch, had a tumour of the palate as large as a pigeon's egg, with swelling of the nose and upper lip, consequent upon a decayed condition of the teeth. Pus escaped from the nose, and there was a fistulous canal from the second incisor to the first molar of the left side.

“As the case seemed an urgent one, I removed the decayed

teeth and stumps, thus destroying the fistula. I then excised the palatine tumour, and found the bone carious and the nasal membrane covering it perforated, which accounted for the discharge of pus from the nostril. I first employed dressings of dry lint, emollient and detergent gargles, and after the subsidence of local inflammation, touched the bone with mercurial water twice in eight days. In this time the sequestrum separated, leaving an opening into the nostril about the size of a quill, which was closed by a prolongation of the mucous membrane. I made use of dressings of dry lint, gently applied, and occasional styptics to suppress exuberant granulations. The entire cure occupied six weeks."

For a great number of similar cases, the reader may consult Jourdain's work.

When local irritants cause or seem to be connected with the disease, they should be promptly and completely removed. The after treatment will be conducted upon general surgical principles.

When a fissure has been permanently formed and its limits ultimately defined, whether it has been congenital or accidental, the indication is to remove the deformity by producing a closure of the fissure, or, if this cannot be done, to supply the deficiency of the parts by such mechanical appliances as may be deemed most suitable.

When the soft palate or some portion of it has been lost, the lesion has been substituted by means of an operation, which has been termed staphyloplasty.*

The operation can be successful only when the perforation is small. It consists in detaching a portion of mucous membrane from the surrounding parts, and so adjusting them with reference to the perforation, as to procure a permanent covering of the cavity, when adhesive inflammation has been effected. The operation is difficult, and requires great dexterity in execution as well as ingenuity in contrivance. Dr. Pancoast, in his *Operative Surgery*, describes an operation of this kind,

* Σταφυλη, the uvula, and πλασσω, I form.

successfully performed by himself, to close a hole near the centre of the hard palate, which formed a communication between the nose and mouth.

The operation for closing a cleft palate is called staphylo-raphy.* It consists in paring away the edges of the fissure and closing them so perfectly as to produce union by adhesion.

The operation has been successfully performed by a great number of surgeons, European and American, and several methods of performing it have been adopted and suggested; each having its advocates.

Dr. S. P. Hullihen, surgeon dentist of Wheeling, Va., of whose surgical skill I have already made mention, had performed this operation successfully eleven times, up to the year 1849. This ingenious surgeon has invented a bistoury for paring the edges of the fissure, which possesses decided advantages over the ordinary double-edged knife. It is composed of two parts, which open like scissors, but when closed, form a double-edged knife or bistoury. The manner of using it is as follows: After first seizing the cleft edge of the velum, at the base of the uvula, with a pair of curved forceps, and putting it on the stretch, the bistoury, with its back towards and against the palate bone, should be pushed through the velum near its edge; then, by opening it, the edges will be pared off in the most even and perfect manner possible.

Further procedure should be suspended until the hemorrhage, although seldom very great, shall have partially subsided. A needle, armed with a well-waxed ligature, and held in a pair of suitable forceps, should be passed from before backwards, through the most dependent part of the left margin, about three lines from the edge. As soon as it is seen on the opposite side, it should be grasped by the assistant, with a pair of long-handled forceps, and as soon as the hold of the port-aiguille is relaxed, drawn through, replaced in the latter, and passed through from behind forwards, the right margin of the velum opposite to the left. After the patient has rested a few minutes, a second, third, or fourth ligature should be introduced.†

* Σταφυλη, and Ραφη, a suture.

† Dic. Dental Science.

Dr. J. C. Warren, and his son, Dr. John Mason Warren, have each performed this operation repeatedly, and with great success. In most of these cases the fissure has extended through both soft and hard palate, and in one case through the jaw and lip.

Dr. J. M. Warren's method has been to dissect off the mucous membrane from the hard palate, on either side, and stretch this across the fissure, and then unite the edges by sutures.

Although it is generally asserted by surgical writers, that when the fissure of the hard palate exceeds an inch, no union can be expected, Dr. Warren has proved by his success in such cases, that the opinion is erroneous.*

Dieffenbach recommends that a longitudinal incision be made at a short distance from the edges of the fissure, in order to permit the closure to be accomplished in the way before mentioned.

A great variety of instruments have been invented by different surgeons, and recommended to be used in this operation. I have already mentioned the cutting scissors of Dr. Hüllihen. A variety of needles and needle-holders have been proposed. Dr. J. C. Warren uses a needle with a movable point. Dr. N. R. Smith prefers a simple lance-shaped instrument, mounted on a handle, and having a slit near its point, which opens at its posterior end. The needle is broader in front of the eye than behind it, which renders the passage of the back part easier. Armed with a ligature, the curved portion of the needle is carried beyond the fissure, and its point introduced behind the middle of the uvula, and as soon as it has come out far enough to expose the ligature in the slit, the ligature is taken hold of with a tenaculum, disengaged from the slit or eye in the needle, and the needle is withdrawn. A second ligature is introduced, half an inch higher up, and, if necessary, a third, at an equal distance from the second. With the ends of the ligature passed through the uvula, this part is drawn forwards, until the fissure in the soft palate shall assume a nearly horizontal position.

* Reese's Cooper's Surgical Dictionary.

Its edges are then cut off with scissors or bistoury. The ligatures are then tied, and the ends cut off.

Dr. Hullihen has invented an instrument for passing the needle, which he calls an *acutenaculum*, and which he thinks better adapted to the purpose than any other. It is composed of a staff and a slide. The staff is a small steel bar, six inches in length, a fourth of an inch in breadth, and an eighth of an inch thick, with an arm at the upper end, rising at a curve from the staff, and half an inch long. On the external or superior side of this arm a duplicate arm is retained by a steel spring attachment, which brings the two arms in close contact, forming the jaws of the instrument. Between these two arms, and on the duplicature, is a small groove, formed to receive the ligature; and when the ligature is pressed between the jaws of the instrument, they open, and it slides to the point designed for its reception, immediately below which, the jaws are perforated with a hole for the introduction of the needle.

Two inches from the inferior end of the staff, a pair of rings are affixed, to receive the thumb and index finger, the rings standing parallel with the staff, and sideways to the direction of the arms of the instrument. A slide formed of steel, equal in length, thickness, and breadth to the staff, is made to fit the upper surface of the staff, and to move with ease up and down, upon guides on the same. From the superior end of the slide is a short, straight, spear-shaped needle, constructed with an eye just back of its point, with a small notch opening to it from the upper surface.

When the ligature has been fitted in its place in the jaws of the instrument, and the slide adjusted to the staff, the slide is forced upwards, the needle and jaws approach each other, and the needle passes through the hole in the latter, just under the ligature, which is caught in the notch of the needle, and as the slide is drawn backwards the eye of the needle is threaded, and the ligature drawn through the velum. This instrument is certainly an ingenious one, and the preference given it by the inventor, who has operated so often and so well, is sufficient commendation.

For a more particular description of this instrument, made intelligible by an accompanying plate, the reader is referred to an excellent article on cleft palate, by Dr. Hüllihen, published in vol. v., page 166, of the American Journal of Dental Science. Concise and admirable directions will also be found in that paper, for conducting every step of the operation.

When the loss of parts is so great as to forbid an attempt to close the fissure by an operation, nothing remains to be done but to cover it by a gold plate or obturator, such as the circumstances of the case will admit. The skilful dentist will often be able to remedy these serious lesions to a very great extent, by well-devised and artistically-executed substitutes.

For a description of these mechanical means, and the mode of adjusting them, I refer the reader to the works on mechanical dentistry.

CHAPTER XXV.

ANÆSTHETICS—CHLOROFORM; SULPHURIC ETHER.

THE term Anæsthetic has been recently introduced into the *Materia Medica* to designate a class of substances which obtund and, if sufficiently administered, suspend the consciousness, and sensibility to pain. They are narcotics, rapid and fleeting in their action, and producing profound stupor, without the danger to life which attends the production of such a condition by other medicines of the class.

The introduction of these agents into medical practice is of very recent date, and though their effects upon the human body, and their applicability to the purposes for which they are administered, have been very carefully studied for several years, the important question of the extent of their availability has not yet been conclusively determined.

The application of Anæsthetics to Dentistry is a subject about which the utmost difference of opinion exists among those whose opinions are most entitled to consideration, and, as upon a question involving such serious issues, all dentists should be better informed than they are likely to be without a much wider range of reading than the common scope of their studies requires, it may not be without advantage to devote a chapter to the examination of this subject.

To devise some means of deadening the sensibilities to such an extent as to permit the performance of surgical operations, without the infliction of agonizing pain, and thus at once to prevent the actual suffering and the preceding dread, which invest these frequently necessary processes of cure with so much of the horrible, has long been a desideratum with the

medical profession, but until an American dentist actually accomplished it by administering ether by inhalation, no progress towards the desired result seemed to have been made.

Sir Humphry Davy had reported a successful experiment upon himself with nitrous oxide, and Mr. Horace Wells made some trials, not altogether without success, with the same agent, as early as 1814. Berzelius had called the attention of chemists to the fact that a mixture of hydrogen with oxygen when inhaled would produce sleep,* but none of these facts led to any practical application of an anæsthetic agent.

In the year 1846, Mr. Morton, now Dr. Morton, a dentist of Boston, after experimenting upon himself and several of his patients, prevailed upon Dr. J. C. Warren to use the ether inhalation, in an operation at the Massachusetts General Hospital. The experiment was only partially successful, but being repeated with more favourable results, the use of Sulphuric Ether as an anæsthetic became frequent, both in this country and Europe. Public opinion was from the first very much divided as to the advantages of the administration. In many of the first experiments ether decidedly failed, and although accounts of successful inhalations were multiplied from various quarters, surgeons found so much of uncertainty and inconvenience in the use of the agent, that it would probably have never come into general use.

Dr. Simpson, of Edinburgh, having attempted the administration of ether in parturition, was led to seek another agent, more certain and less objectionable, and after experimenting with various substances, announced the discovery of the extraordinary powers of Chloroform.

Dr. Simpson's high standing in the profession, and the number of successful experiments made by him, produced the most enthusiastic excitement with regard to the new agent, not only among surgeons and obstetricians, but the public generally. Chloroform was administered freely in an immense number of cases, and of course often very imprudently, yet there was a considerable time before a fatal accident occurred. At last, however, several deaths under the use of this agent were announced,

* Beck's *Materia Medica*, article *Anæsthetics*, by Dr. Gilman.

in frightful succession, and the profession and the public were taught that every good partakes of the imperfect condition to which human affairs are subject, and may by imprudence and ignorance be made an evil.

Since the dangerous nature of chloroform and ether have been discovered, we have reason to wonder that a far greater number had not fallen victims to the recklessness with which the new medicines were administered and inhaled.

These powerful agents were not only prescribed by surgeons who had yet to learn the extent of their control over the human system, but were inhaled by thousands for amusement, and to satisfy curiosity.

COMPARATIVE ADVANTAGES OF CHLOROFORM AND ETHER.

With regard to the preference which should be given to one or the other of these agents, there has been much controversy, and there yet is much difference of opinion.

Those whose name and fame were identified with the success of ether felt naturally reluctant to permit it to be superseded by another anæsthetic, and their prominent position to be occupied by others; while the discoverer of chloroform, and those who were the first to proclaim its powers, may be supposed to have been excited by a similar feeling, to exaggerate the importance of their own agent, and deny the value of ether. The surgical profession, however, having no personal interest in the matter, set themselves carefully to investigate the several propositions submitted on the one side and the other, and the decided judgment is upon the whole favourable to chloroform.

The comparison made by Dr. Simpson, who first introduced the anæsthetic use of chloroform, between this agent and ether, is thus set forth in his pamphlet :

1. A greatly less quantity of chloroform than of ether is requisite to produce the anæsthetic effect, usually from a hundred to a hundred and twenty drops of chloroform being sufficient, and with some patients much less. I have seen a strong

person, rendered completely insensible by six or seven inspirations of thirty drops of the liquid.

2. Its action is much more rapid and complete, and generally more persistent. I have almost always seen from ten to twenty full inspirations suffice. Hence the time of the surgeon is saved, and the preliminary stage of excitement which pertains to all narcotizing agents being curtailed, or indeed practically abolished, the patient has not the same degree of tendency to exhilaration and talking.

3. Most of those who know from previous experience the sensation produced by ether inhalation, and who have subsequently breathed the chloroform, have strongly declared the inhalation and influence of chloroform to be far more agreeable and pleasant than those of ether.

4. I believe that considering the small quantity requisite as compared with ether, the use of chloroform will be less expensive than that of ether.

5. Its perfume is not unpleasant but the reverse, and the odour of it does not remain, for any length of time, obstinately attached to the clothes of the attendant or exhaling, in a disagreeable form from the lungs of the patient, as so generally happens with sulphuric ether.

6. Being required in much less quantity it is much more portable and transmissible than sulphuric ether.

7. No inhaler or instrument is necessary for its exhibition. A little of the liquid diffused upon the interior of a hollow shaped sponge or a pocket handkerchief, or a piece of linen or paper, and held over the mouth and nostrils, so as to be fully inhaled, generally suffices in about a minute or two, to produce the desired effect.

Dr. Henry J. Bigelow, in an admirable paper upon anæsthetic agents, appended to the report of the committee on surgery, published in the first volume of the transactions of the American Medical Association, testifies that there is no difference of importance in the general character of the insensibility or other symptoms resulting from the inhalation of ether, and chloro-

form. The latter is much more potent than ether, more palatable, and less irritating to the lungs.

Dr. Gilman, in the report of the Committee on Obstetrics, Vol. II. of Transactions of American Medical Association says: There are to ether some very strong objections. It sometimes irritates the respiratory apparatus to such a degree, that its continued use and the production of anæsthesia by it are impossible. It is sometimes impossible to get the patient beyond the state of excitement, and this state is always longer and more violent than when chloroform is used. Ether is more often followed by unpleasant effects, as headache, soreness of the chest, &c. In some persons it produces a very free flow of saliva, which entering the posterior fauces may embarrass respiration. The advantages of chloroform are, a smaller quantity is required, fewer persons resist its influence, and it produces no cough, choking, salivation, or other evidences of irritation of the mucous membrane. The state of excitement is avoided, or is so short as to amount to nothing. In short, chloroform has every advantage except safety. The Doctor then proceeds to show that the danger of administering chloroform is rather due to the inexperience or carelessness of administrators than to any necessary quality of the agent itself.

In the report on Surgery published in the same volume, Dr. N. R. Smith gives his voice decidedly in favour of chloroform over ether, as by far the most powerful anæsthetic, and least annoying in the act of respiration. Dr. Smith is not satisfied, that in point of safety, there is much real advantage in the use of ether. In the first two instances of the employment of ether in his practice, though the administration was effected by an experienced gentleman from Boston, the result was very unfortunate. In neither instance was the anæsthetic influence complete, and in both there resulted great perturbation of the vascular and nervous systems, characterized by delirium and a pulse of 140 per minute. Both patients remained in a doubtful state in regard to recovery, for forty-eight hours. In another instance, in which the same surgeon employed ether in the amputation of the female breast, an unusual degree of irritative fever fol-

lowed the operation, resulting, after some twenty days, in fatal consecutive abscess of the right pleura.

The reporter proceeds: "We believe that the deleterious effects of ether are less clearly chargeable to this agent, because they are more remote, and therefore likely to be referred to other causes. The fatal effects of chloroform, being almost instantaneous, are referable to nothing else. The post hoc, propter hoc here strikes the mind with irresistible force. It must also be borne in mind, in comparing the safety of chloroform with that of ether, that the former agent has been employed much more extensively than ether, though of more recent discovery and application. The use of ether had scarcely become general when it was superseded by the discovery of Mr. Simpson, and at this time the reported cases of its employment are twenty fold more numerous than those of the employment of ether.

"He who fixes his attention exclusively on the fatal cases from chloroform, without adverting to the vast number in which it has been employed, is very naturally filled with alarm. But when we consider that this agent has probably been administered to millions of subjects, and that only fifteen cases of death from its use can be adduced, the individual who subjects himself to its influence ought to feel no more apprehension than he who takes his seat in a railroad car, and much less than one who essays a voyage across the Atlantic. The conclusions of the Committee upon this subject are thus summarily expressed:

"Contemplating all the facts which, in relation to the use of anæsthetic agents, have been contributed during the past year, your Committee congratulate the Association on the great progress which has been made in establishing professional and public confidence in these extraordinary agents, and on the vast benefit which is likely to result to mankind, from this achievement of science and humanity. To them the recorded experience of surgeons, at home and abroad, appears abundantly to justify the following conclusions.

"1. The means of generally rendering patients insensible to the pain of surgical operations, so long a desideratum, have at

length been furnished in the anæsthetic agents, sulphuric ether, chloroform, and chloric ether.

“2. The employment of these agents for obviating pain in most severe surgical operations is now not only justifiable, but the imperative duty of Surgeons, and indeed we may almost adopt the language of Professor Miller, before the Medico-chirurgical Society of Edinburgh, that ‘no one among his surgical friends would deem himself justified, morally or professionally, in now operating upon a patient in a waking and sensitive state.’

“3. Of the anæsthetic agents, chloroform is decidedly the most efficient and facile of respiration; but being most powerful, is at the same time most dangerous, when incautiously employed.

“4. In formidable and painful operations, chloroform not only obviates pain, but contributes to the safety of the patient, by preventing shock, and the irritation which is the antecedent, and, to a certain extent, the cause of inflammation.

“5. The use of chloroform is inadvisable in trivial cases, because the danger from its use is greater than that from the operation. All must admit that of the two objects to be held in view in a surgical operation, safety and immunity from pain, the former is the more important.

“6. In regard to circumstances under which chloroform should be employed, we adopt the conclusions of the French Academy: ‘It should not be used when there exists any disease of the heart, any aneurism near the heart, any threatening dyspnoea, any tendency to engorgement of the lungs or brain. Care must be taken, that during the inhalation, atmospheric air be sufficiently mixed with the vapour of chloroform, and that respiration be carried on freely. The inhalation should be suspended as soon as insensibility is obtained.’

“7. The best vehicle for the administration of chloroform or ether is a handkerchief or sponge of loose texture, through which the atmosphere may be copiously inhaled.”

However similar may be the ultimate effects of ether and chloroform as to the production of insensibility, the result does

not seem to be attained by the same mode of action upon the nervous system.

Ether is decidedly stimulating in the first instance, and the degree of excitement or intoxication it produces is sometimes so great as seriously to embarrass or even prevent the operation it is intended to facilitate. Like all other excitements, this is followed by corresponding depression, and the secondary effects of the agent are therefore to be seriously considered, when the administration of ether is proposed. Chloroform seems to be directly depressing or sedative in its action, lessening the sensibility of the nervous system, without any preceding stage of excitement, or exhilaration. I have administered chloroform in a number of instances, but have never seen it produce a condition which might be termed intoxication.

EFFECTS OF CHLOROFORM.

After one or two deep inspirations the patient feels a pleasant languor, attended with a sort of tingling sensation in his extremities; some confusion of the understanding follows, throbbing sounds are heard in the head—numbness succeeds, consciousness is lost, the muscles are rigid, and sensibility is much obtunded. If the inhalation be continued, the sleep becomes profound; the breathing deep and heavy, regular, sometimes stertorous, the muscles relaxed, and insensibility complete.

The pulse continues regular, though often somewhat feeble, until the inhalation has been carried to a dangerous extent. It then sometimes suddenly becomes decidedly weak, fails rapidly, the breathing becomes irregular and interrupted, and syncope ensuing, the patient expires.

Dr. Gilman says that he has frequently seen consciousness survive insensibility. Commonly the sensibility survives consciousness, and a patient, apparently asleep, will manifest extreme suffering under an operation, by his contortions and cries.

Extreme dread of an operation will keep awake both the consciousness and sensibility long after the understanding has been narcotized by the anæsthetic.

I remember to have administered chloroform for a dentist to a young gentleman who had several molar teeth to be extracted, and who from the peculiar formation of his teeth had suffered exceedingly in previous operations of the kind. Although he was resolutely bent upon having the operation performed, such was his dread that after being brought apparently under the full influence of chloroform, the attempt to touch his mouth aroused him so far as to cause him to say, "Now I perceive that you are adjusting the instrument" &c., describing sensations which really did not exist, as at the time no attempt was making to apply an instrument. It is remarkable that although a patient may manifest suffering by contortions and cries, yet when the anæsthetic passes off, there is never any recollection of the pain. Whether the patient, under these circumstances, has really derived any advantage from the chloroform, is a question which I will leave to philosophers.

MODUS OPERANDI OF ANÆSTHETICS.

That these agents act upon the nervous system by passing into the circulation, and modifying the blood, is plain enough, but the particular modification which they effect, and the manner in which the nervous system is acted upon by it, are as yet unknown to us.

The order of affection, as given by Houvers, is this :

First the cerebral lobes lose their power, and intellect is impaired ; then the cerebellum is affected, and the power of regulating locomotion lost ; afterwards the spinal marrow, and sensation and motion are gone ; lastly, the medulla oblongata, the motive power of respiration, breathing ceases, and death is the result.

The pithy remark of Dr. Gilman upon this dogmatical exposition is a satisfactory comment. "This sounds very well, but it seems to me that any one who has studied this matter by the bedside will be quite unable to reconcile what he then sees with the order of Mr. Houvers ; what, for example, was the state of the cerebrum and cerebellum of the Irishman operated

on at the London Hospital, who made faces and jokes while insensible of the pain of an amputation? (London Med. Gaz. January 22, 1847.) Is the cerebrum and cerebellum affected when a patient in labour takes the handkerchief from her attendant, presses it to her face, and expresses in the warmest terms the relief from pain which is afforded her? All this must manifestly be restudied."

CONDITIONS FORBIDDING THE USE OF ANÆSTHETICS.

Observation of the action of chloroform and ether leads us to consider the administration of them dangerous and improper,

1. To persons labouring under organic diseases of the heart or great vessels.

2. To persons who are subject to cerebral congestions, or whose brain is in any way unhealthy. Epileptic and hysterical patients are not proper subjects for anæsthesia.

3. To persons disposed to hæmoptysis or to pulmonary congestion, and to phthisical patients in all stages of that disorder.

4. To feeble persons, with a weak circulation; to the chlorotic or anæmic.

5. It must be remembered that the nervous system is much more readily impressed by medicinal agents, and especially by narcotics, soon after bleeding; and when the patient has evidently been weakened by recent loss of blood, anæsthetics should be administered with great caution, if at all.

ANÆSTHESIA IN DENTAL OPERATIONS.

It being clearly established that chloroform and ether may be so given as to prevent the dread and suffering attendant upon surgical operations, and that the administration of these agents is entirely safe in a vast plurality of instances, the important question is to be determined, In what cases is it the duty of the surgeon to give the patient the advantage of these anæsthetics?

Pain is the greatest of all bodily evils. Even when not com-

paratively severe, it is dreaded in prospect and borne with impatience, while the agony of most surgical operations is appalling to the stoutest heart. These operations, too, are generally performed upon individuals whose sensibilities have been sharpened, and nervous systems weakened, by severe or long-continued suffering. They are of all others the least able to endure the infliction of the exquisite tortures of surgery. At first thought common humanity seems to require that the benevolent gift of heaven, anæsthetic oblivion, be dispensed to all whose unhappy state may drive them under the surgeon's knife or to the dentist's chair.

If anæsthesia were always safe, this would be a just conclusion, but unfortunately it is sometimes a fatal gift. How then shall we prescribe limits to its use?

In the higher surgical operations, where recovery from the operation is not certain, statistics seem to show that the danger arising from the use of chloroform is more than compensated by the exemption from shock and pain; the mortality being less under anæsthesia. In all these cases then, except where circumstances exist which render the inhalation uncommonly perilous, anæsthesia should be preferred. There can be no reason to the contrary. The surgeon is as fully warranted to give chloroform in such cases, as he would be to give opium.

In obstetric practice, too, the degree of anæsthesia required to make the patient comfortable is not so profound as in surgical operations, and the danger appears to be very inconsiderable. In severe cases of parturition, it is evident that the chances of escape to the mother are increased by anæsthesia, therefore the administration, in the hands of a judicious accoucheur, seems entirely justifiable. In dentistry, the operations do not involve life. The pain, though very great, is not so frequently inflicted upon the sick and feeble, and is generally of short duration. It cannot be said that anæsthesia here offers compensation for any mortality which accompanies its use. Certainly it would be better that all should endure the pain occasionally inflicted by the dentist, than that the life of one human being should be sacrificed to procure them exemption. Yet

anæsthesia has already taken many lives in exchange for what relief it has given to the subjects of dental operations.

Painful experience has shown that the use of anæsthetics has been more dangerous in the hands of dentists than of other administrators, death having more frequently occurred in attempts to save the patient from the pain caused by the little operation of extracting a tooth, than perhaps from all the instances in which anæsthetics have been administered to prevent the consciousness of suffering in capital operations.

The greater danger of anæsthesia in dental operations is easily accounted for.

The operation has to be performed upon an organ concealed in the cavity of the mouth. The preliminary stages of the operation, adjusting instruments, &c., cannot be accomplished until the patient has been made unconscious. The mouth then is generally found spasmodically closed, and cannot be forced open without considerable effort. In the mean time, the patient cannot continue the inhalation, the soporific effects of the anæsthetic pass off, and by the time the operator has accomplished the separation of the gum, consciousness has returned.

In an operation upon any other part of the body than the organs through which inhalation is accomplished, the surgeon having the patient in a proper position for the immediate operation, can commence it as soon as anæsthesia is effected, and can proceed without interrupting the inhalation, which can be continued, according to circumstances; the patient not being profoundly, but continually narcotized.

But the dental operator must carry anæsthesia so far as to produce relaxation of the muscles of the jaw; or what I think is more commonly the case, to so completely overwhelm the consciousness as to obviate that instinctive resistance which seems to linger after volition appears to be suspended. When the patient begins to inhale the chloroform, his mind is intently occupied with the anticipated attack upon his teeth, and his fears are concentrated upon the dread of the attack being prematurely made. By his eyes and hands he continually gives signals of consciousness as long as he can, and the last effort

of volition is to clench the jaws as firmly as possible. Muscular life being less easily overcome than intellectual, the extreme anæsthetic effect of chloroform or ether has to be induced in order to overcome the difficulty.

Again, as the dentist cannot continue the administration of the anæsthetic while operating, at least not with any regularity, he is obliged to carry the anæsthesia so far as to permit a certain degree of it to pass off without the restoration of consciousness. In other words, he must produce *super anæsthesia*, because he must provide against the known evanescence of the condition.

Another reason why dental anæsthesia has proved so fatal, is, I doubt not, the position in which the patient inhales the narcotic vapour.

Invariably the subject of the operation is placed in a chair, with the head nearly upright; consequently, when anæsthesia is carried so far as to cripple the action of the heart, the patient readily faints; syncope, the almost or entire suspension of the heart's action, finds the patient in the worst possible condition for reaction, owing to the depressed state of the nervous system, consequently it often happens that no reaction takes place, and the patient almost immediately expires.

That this is the manner in which death occurs in most cases of fatal anæsthesia appears to me evident. That occasionally a state resembling apoplexy may be induced, and the patient not recover, may be true; but apoplexy does not destroy life immediately, generally not hastily, unless from copious effusion in the brain, which cannot be supposed to take place in anæsthesia. Cases of profound and fatal apoplexy generally continue for several days, sometimes for two weeks, before death. But death from chloroform is sudden, and always results immediately from cessation of the heart's action. Now the action of the heart is kept up under deep and fatal congestion of the brain, until it gradually weakens through exhaustion of vitality, unrenewed by alimentation, rather than from any deadly influence acting upon the organ itself.

Again, by regarding syncope as the cause of death in these

cases, we have explained the singular fact that anæsthesia has been less perilous to the patient in parturition than under other circumstances. Parturient females are not only not prone to faint, but are almost uniformly in a recumbent position during the administration of the anæsthesia; a position in which syncope cannot occur until the heart's action be enfeebled to the last degree.

I am convinced, then, that *anæsthetics should always be administered to the patient in the recumbent position.*

They should never be administered to a patient in whom the heart's action is at the time very feeble, whether from dread or otherwise.

They should never be administered to a patient subject to fainting fits.

Since writing the above, I have read several accounts of cases of death from the use of anæsthetics, which tend to confirm me in the opinion that the position of the patient has much to do with the fatality of the inhalation.

One of these cases happened in the chair of a dentist, and two in the hands of the general surgeon. In both these latter cases the patient seems to have died from syncope, the result of position.

In one instance, the patient was a little girl, 12 years old, who had a tumour to be extirpated from the thigh. The patient was placed upon the side of the bed, in the upright position, supported (held upright) by proper assistance. The anæsthesia effected, she was laid down, but the effect going rapidly off, she was again upright. The surgeon goes on to relate that the chloric ether was again administered until the head dropped. The first stroke of the knife, however, roused her so much that it became necessary to restrain her, and at the same time the surgeon directed the sponge to be applied until she should cease to strive. In about three minutes the struggles ceased, the sponge was withdrawn, and in five minutes more the tumour was removed. At this time the pulse and respiration caused alarm. Immediately they commenced giving stimulants, applying ammonia to the nose, dashing water on the face and chest,

rubbing and elevating the extremities, exciting artificial respiration, and using all the means recommended in such cases, but without avail. The respiration became more feeble, the pulsations of the heart hardly perceptible, and continuing in this state fifteen or twenty minutes, she died.

The other case was that of a lad of 17, who came to the office of a surgeon about noon, for surgical aid, on account of a badly lacerated hand. He was pale, and suffering much pain, and "trembled like an aspen leaf, when he was coming to the shop."

A mixture of chloroform and chloric ether was administered perseveringly, as it made him sick. When under its influence, the dressing of his hand was commenced, but very soon the assistant called the attention of the surgeon to the patient's face. The surgeon continues, "I saw at once that he was either dead or dying, and directed my assistants to *help me lay him at once on his back*. I found the pulse at the wrist gone, the action of the heart very feeble indeed, and respiration in a moment ceased, a few heaving inspirations at long intervals, the action of the heart meanwhile growing more and more feeble, and all was quiet—my patient was dead."

The surgeon then proceeds, at some length, to express his entire inability to account for the young man's death, until he is relieved by the suggestion of a bystander, that he died of fear. He says, "My conclusion then is, that the fatal consequence attending etherization in the present instance, is not owing to any inferiority in the article used, to want of care in its administration, nor to any organic disease in the patient; but that we must look for it in the naturally delicate organization of the subject, rendering him very sensitive to external impressions, in the shock that the nervous system had sustained in the injury, and last but not least in the influence of fear; not in any one of these singly, but in the three combined.

My conclusion is, that the patient would certainly have fainted under the dressing, whether he had taken the chloroform or not. He was in a fainting condition when he came into the office, "pale and trembling like an aspen leaf;" and that he would faint if kept in an erect position during the dressing was *certain*.

Under these circumstances, to lessen the energy of the nervous system was to render reaction exceedingly doubtful, or impossible. The chloroform was given—the nervous centres lulled into insensibility—the patient fainted—there was no reaction, and he died.

I have not *selected* these two cases. They were published in consecutive numbers of the Boston Medical and Surgical Journal, for the present month, and seemed so corroborative of the opinion I have expressed that I have recorded them here. That a careful observation of the fatal cases reported will still further show the importance of position to the consequences of anæsthesia, I have no doubt. I do not mean to say that to one in the recumbent position anæsthesia is always safe, but that to one in the upright position it is always dangerous.

The dentist is rarely warranted to administer anæsthetics. If he does so frequently, experience may teach him to expect, that sooner or later he will cause the death of a patient. Upon this supposition he must proceed, and as he cannot pretend to be compelled to risk anæsthesia through the necessity of saving life, he must, if he employs it, assume a most serious and unenviable responsibility.

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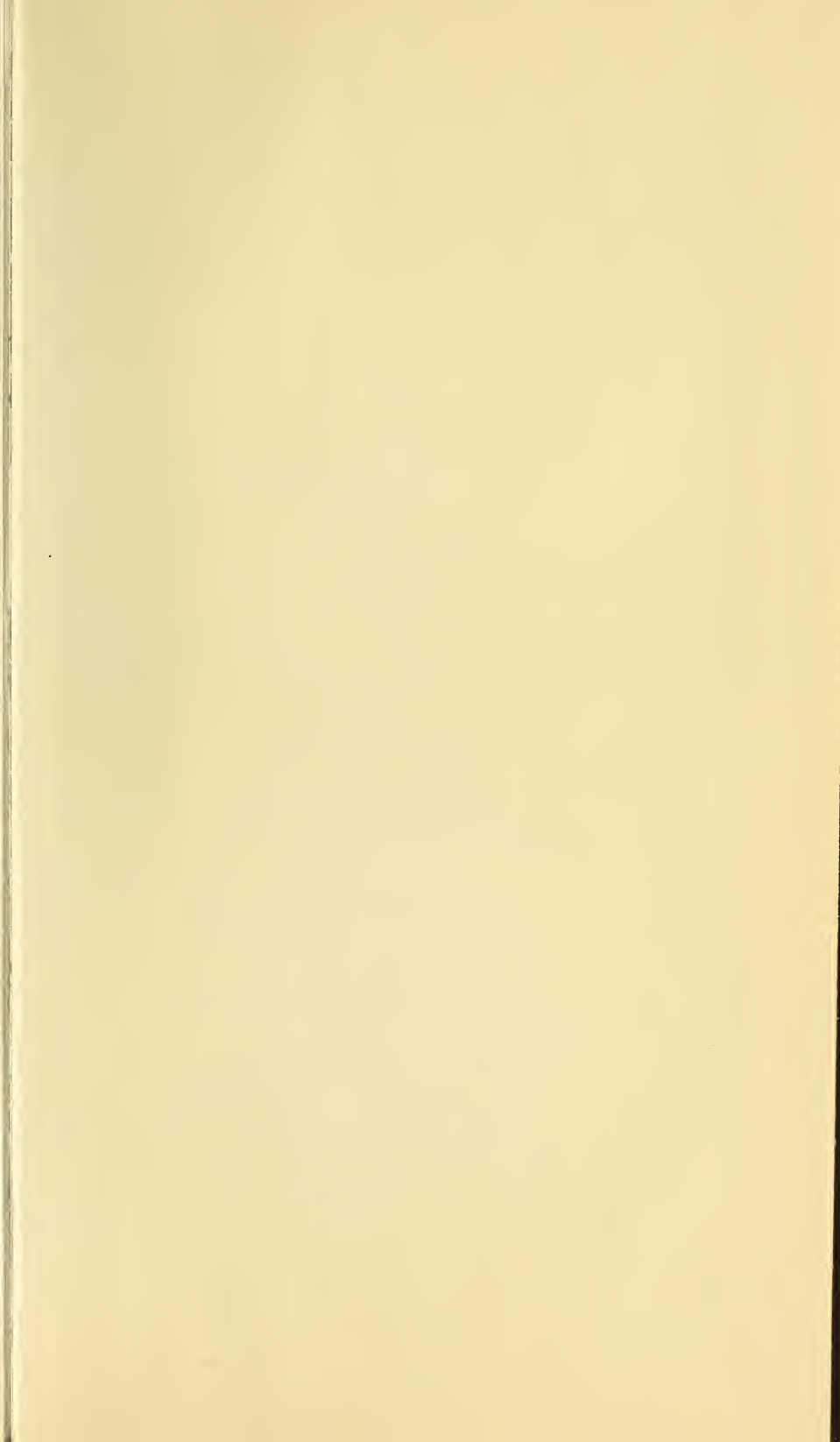
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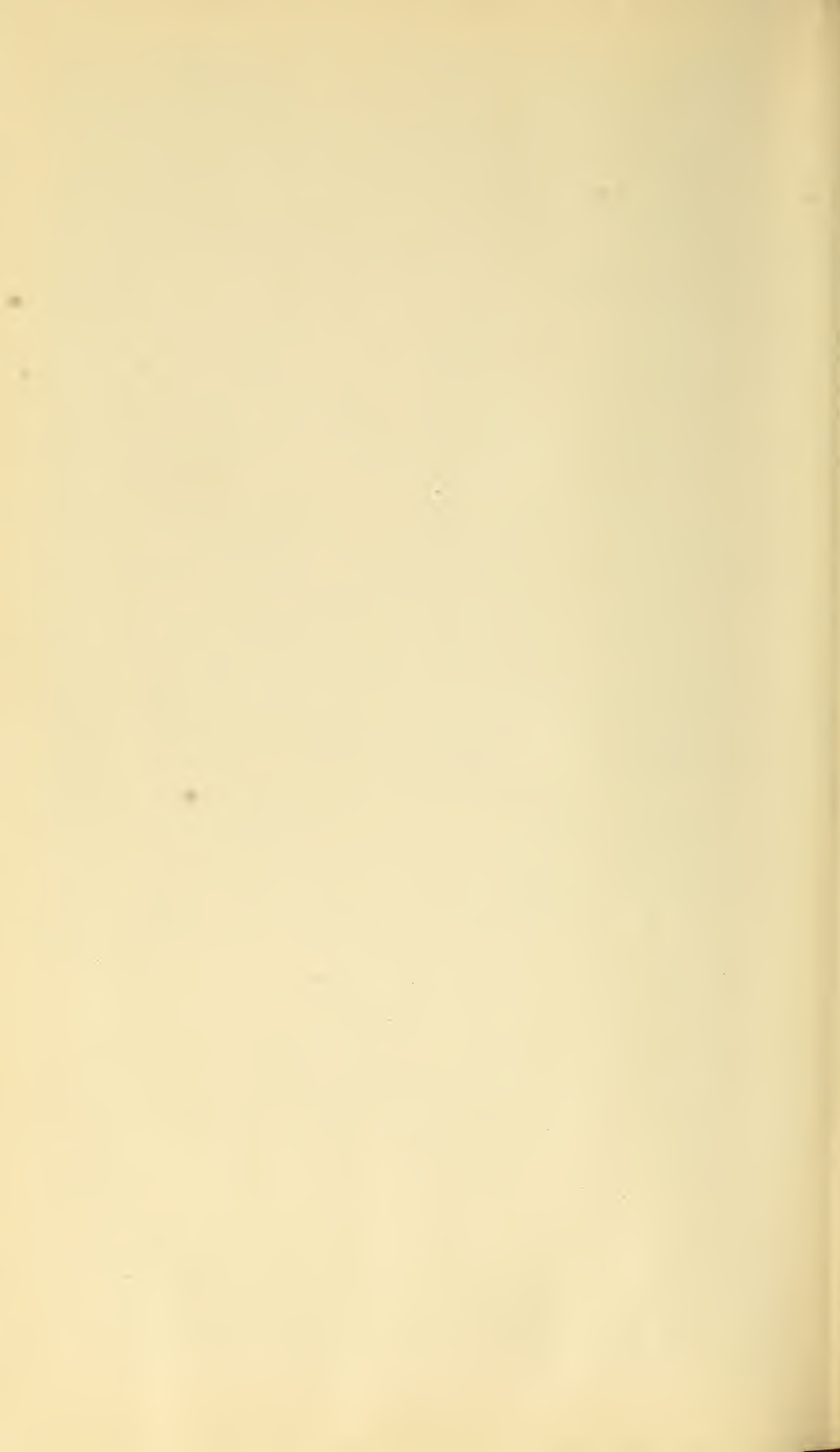
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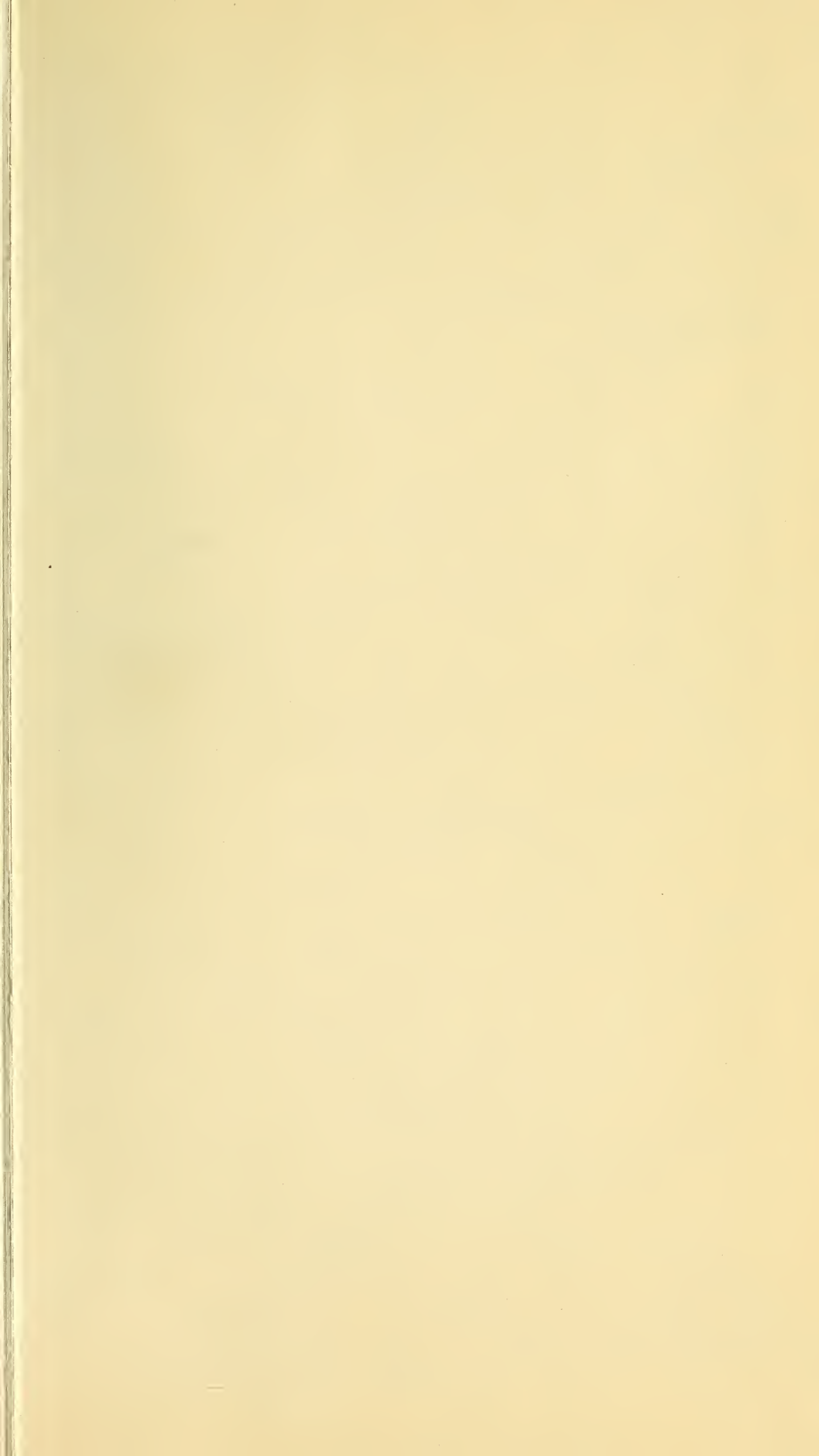
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